4.0 ENVIRONMENTAL ANALYSIS

The environmental consequences of constructing and operating the proposed Alberta Clipper Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short term, long term, and permanent. Temporary impacts generally occur during construction, with the resources returning to pre-construction conditions almost immediately afterward. Short-term impacts could continue for approximately 3 years following construction. Impacts were considered long term if the resources would require more than 3 years to recover. Permanent impacts would occur as a result of activities that modify resources to the extent that they would not return to pre-construction conditions during the life of the proposed Alberta Clipper Project, such as with construction of aboveground structures. An impact resulting in a substantial adverse change in the environment would be considered significant.

This section discusses the affected environment, construction and operations impacts, and mitigation for each affected resource. Enbridge has indicated that it would implement certain measures to reduce environmental impacts. These measures have been evaluated and additional measures that might be necessary to further reduce impacts are recommended. The recommended measures are shown as bulleted, boldface paragraphs in the text of the EIS.

Conclusions in this EIS are based on the analysis of environmental impacts and the following assumptions:

- Enbridge would comply with all applicable laws and regulations;
- The proposed facilities would be constructed as described in Section 2.0 of this EIS; and
- Enbridge would implement the mitigation measures identified in its filings to DOS, and adhere to all federal, state, and local permit requirements.

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4.1 GEOLOGY

This section describes the physiography and surface and bedrock geology in the Alberta Clipper Project area, and evaluates the potential impacts that may result from Project implementation. It also addresses paleontological and mineral resources and geologic hazards.

4.1.1 Environmental Setting

4.1.1.1 Physiography and Surface and Bedrock Geology

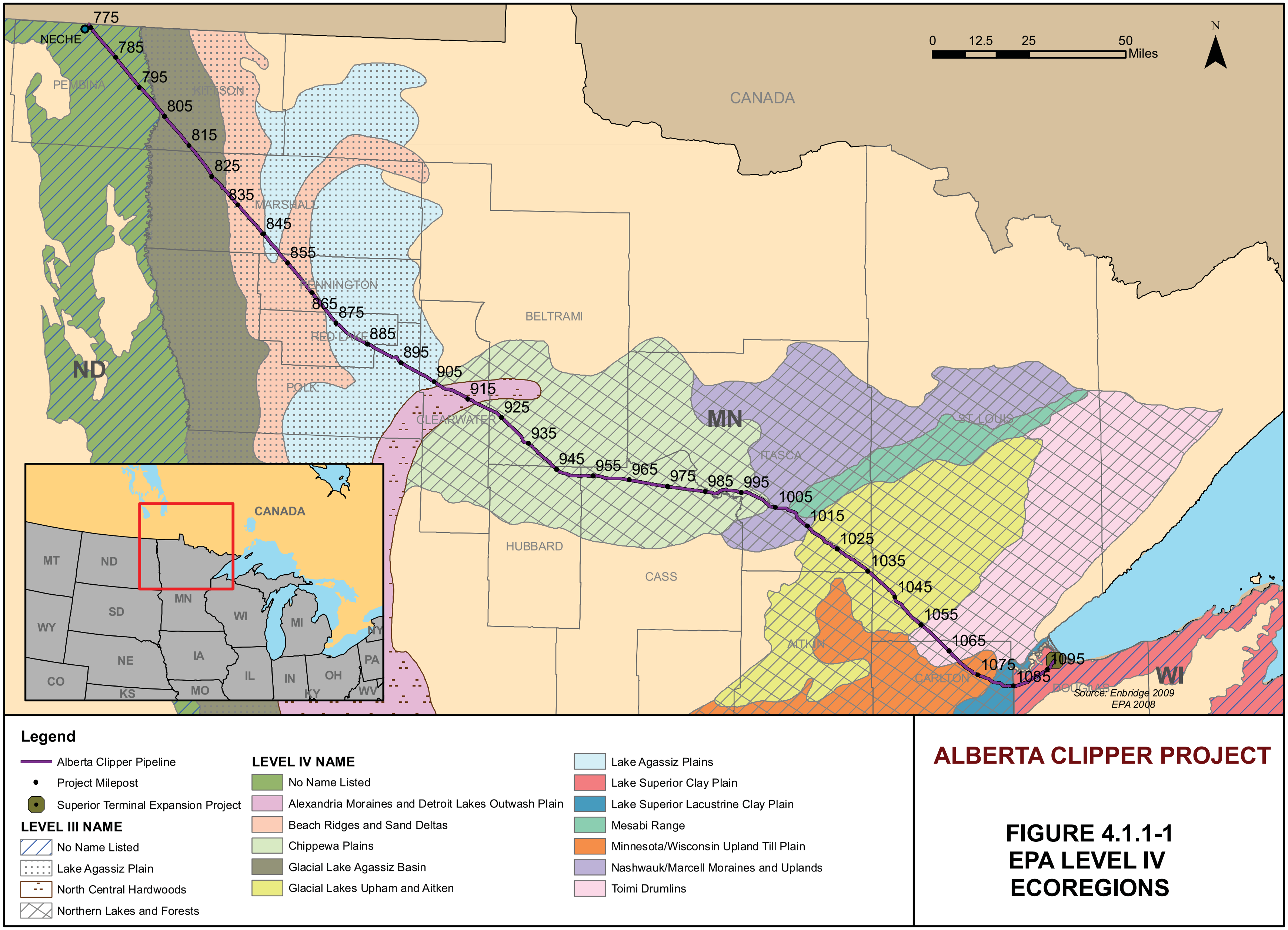
The physiography of the region that would be crossed by the proposed Alberta Clipper pipeline is discussed below in terms of EPA-classified ecoregions. "Ecoregions" group geographic regions according to similarities in the type, quality, and quantity of environmental resources, for the purposes of environmental resource management. Level I Ecoregions are subdivided into Level II Ecoregions, which are further subdivided into Level III and Level IV Ecoregions; each subsequent level is more specific and encompasses a smaller geographic area.

Physiography

The proposed Alberta Clipper Project route crosses the U.S./Canada border near Neche, North Dakota at the western edge of the Glacial Lake Agassiz Plain (Figure 4.1.1-1). The glacial Lake Agassiz was a proglacial lake that filled what is now the Red River Valley during the Pleistocene (Bryce et al. 1998). The resulting plain is composed of lacustrine sediments underlain by glacial till. Because of the lacustrine deposits, the landscape in the region is extremely flat except at its margins, where deltas and beach ridges mark the former shoreline of the lake.

The pipeline route continues to the southeast, exiting the Glacial Lake Agassiz Plain and entering the northern portion of the North Central Hardwoods Region at approximately MP 906 (Figure 4.1.1-1). The North Central Hardwoods is characterized by glacial moraine and outwash plain deposits (White and Omernik 2007). During the Pleistocene, this area marked the southern edge of the Wadena lobe of the Laurentide ice sheet. Because of the moraine and outwash deposits, the topography is irregular with numerous kettle lakes in both moraine and outwash deposits. Within this stretch of the pipeline route, only one EPA Level IV Ecoregion, the Chippewa Plains, is crossed. Regional physiographic descriptions are provided in Table 4.1.1-1.

The proposed pipeline route exits the North Central Hardwoods Region at approximately MP 917 and enters the Northern Lakes and Forests Ecoregion (Figure 4.1.1-1). A total of 180 miles of the proposed 326.9-mile pipeline would be within this ecoregion. Surface features in the region were formed during the Pleistocene glaciation. Topography is characterized by large, gently rolling till plains—hilly areas formed by glacial moraines and outwash plains (Enbridge 2007). In this southernmost section of the proposed pipeline route, the proposed pipeline would traverse six Level IV Ecoregions (Chippewa Plains, Nashwauk/Marcell Moraines and Uplands, Glacial Lakes Upham and Aitken, Toimi Drumlins, Minnesota/Wisconsin Upland Till Plain, and Lake Superior Lacustrine Clay Plain)—each with a distinct physiography.



ALBERTA CLIPPER PROJECT

FIGURE 4.1.1-1
EPA LEVEL IV
ECOREGIONS

TABLE 4.1.1-1
Physiographic Characteristics of Ecoregions Crossed by the Proposed Alberta Clipper Project

Milepost Range	Physiographic Description	Surface Geology	Bedrock Geology
Glacial Lake Agassiz Plain – Glacial Lake Agassiz Basin[a,c]			
774–830	Extremely flat glacial lake plain. Streams and rivers sluggish, meandering, and highly turbid with large sediment loads. Ditching and channelization common.	150–300 feet of glacial drift overlain by up to 95 feet of silt/clay lake deposits	Cretaceous shales and sandstones with Ordovician and Precambrian basement
Glacial Lake Agassiz Plain – Beach Ridges and Sand Deltas[a,c]			
830–845; 851–870	Parallel ridges up to several miles wide composed of medium sand to medium gravel. Deltas comprised of lenses of fine to coarse sands. Thickest sand deposits windblown into dunes. Stream substrates, sand, or gravel riffles contrast with clay and silt bottom streams elsewhere in Red River Valley.	Stratified sands and gravel beach deposits interlayed with lacustrine silts and sandy deltaic lenses	Cretaceous shales and sandstones with Ordovician and Precambrian basement
Glacial Lake Agassiz Plain – Lake Agassiz Plains[a,b,c]			
845–851; 870–906	Extremely flat glacial lake plain. The drainage network is undeveloped. Rivers and streams commonly meander extensively. Ditching and channelization common.	100–400 feet of calcareous glacial drift	Cretaceous shales and sandstones with Ordovician and Precambrian basement
North Central Hardwoods – Alexandria Moraines and Detroit Lake Outwash Plains[a,b,c]			
907–917	Glacial end moraines, ground moraines, and outwash plains. Numerous kettle lakes in both moraine and outwash deposits.	150–500 feet of glacial drift	Cretaceous shales and sandstones with Ordovician and Precambrian basement
Northern Lakes and Forests – Chippewa Plains[a,b,c]			
906–907; 917-1003	Ground and stagnation moraines, glacial lake deposits, and outwash plains. Flat to gently rolling topography with numerous lakes. The Mississippi River runs through this ecoregion. The drainage network is poorly developed.	200–600 feet of glacial drift	Early to mid Precambrian rock consisting of gneiss, undifferentiated granite, and meta-morphosed mafic
Northern Lakes and Forests – Nashwauk/Marcell Moraines and Uplands[a,b,c]			
1003–1016	End moraines, rolling till plains, and flat outwash plains. Topography is flat to gently rolling. Numerous lakes are present—many on the Nashwauk Moraine.	Commonly greater than 100 feet of glacial drift. Giants Range has a thin blanket of glacial drift over bedrock.	Early to mid Precambrian rock consisting of gneiss, undifferentiated granite, and meta-morphosed mafic volcanic and sedimentary rock

TABLE 4.1.1-1 (continued)
Physiographic Characteristics of Ecoregions Crossed by Proposed Pipeline Project

Milepost Range	Physiographic Description	Surface Geology	Bedrock Geology
Northern Lakes and Forests – Glacial Lakes Upham and Aitken[a,b,c]			
1016–1055	Relatively flat glacial lake plain. Rivers and streams meander extensively due to the predominantly level landscape. There are few lakes in the region.	100–300 feet of glacial drift	Middle Precambrian rock consisting of argillite, siltstone, quartzite, or greywacke, weakly metamorphosed. In addition, Cretaceous shale and sandstone can be found in the southwestern portion of the region.
Northern Lakes and Forests –Toimi Drumlins[a,b]			
1055–1069	Topography is rolling and contains a drumlin field characterized by ridges and troughs.	Glacial drift less than 100 feet thick	Precambrian-aged rock consisting of sandstone, arkose, shale, basalt, and gabbro to the north and quartzite to the south
Northern Lakes and Forests – Minnesota/Wisconsin Till Plain[a,b]			
1069–1079	Ground and end moraines form gently rolling till plains and drumlin fields. The drainage network is young and undeveloped with extensive areas of wetlands.	100–300 feet of glacial drift throughout the majority of the ecoregion. Bedrock is locally exposed throughout the northern portion of the region.	Middle and late Precambrian and early Proterozoic gneiss, amphibolite, undifferentiated granite, and metamorphosed mafic
Northern Lakes and Forests – Lake Superior Lacustrine Clay Plain[a,b,c]			
1079–1098	Flat to undulating lake plain and outwash lowland. Deep valleys are present in areas along rivers and streams. A well developed drainage pattern exists in the region, with numerous V-shaped valleys up to 150 feet in depth.	50–100 feet of glacial drift	Precambrian sedimentary bedrock, primarily feldspathic to quartzose sandstone and shale, and includes lithic sandstone and siltstone

[a] Source: University of Minnesota No Date.
[b] Source: White and Omernik 2007.
[c] Source: Bryce et al. 1998.

Surficial and Bedrock Geology

In North Dakota, the Alberta Clipper Project would extend from the U.S./Canada border near Neche, North Dakota, approximately 28 miles before crossing into Minnesota. The bedrock under the North Dakotan section of the proposed pipeline route consists of Jurassic shales limestone, gypsum, and anhydrite as well as Upper Cretaceous silty to sandy shales.

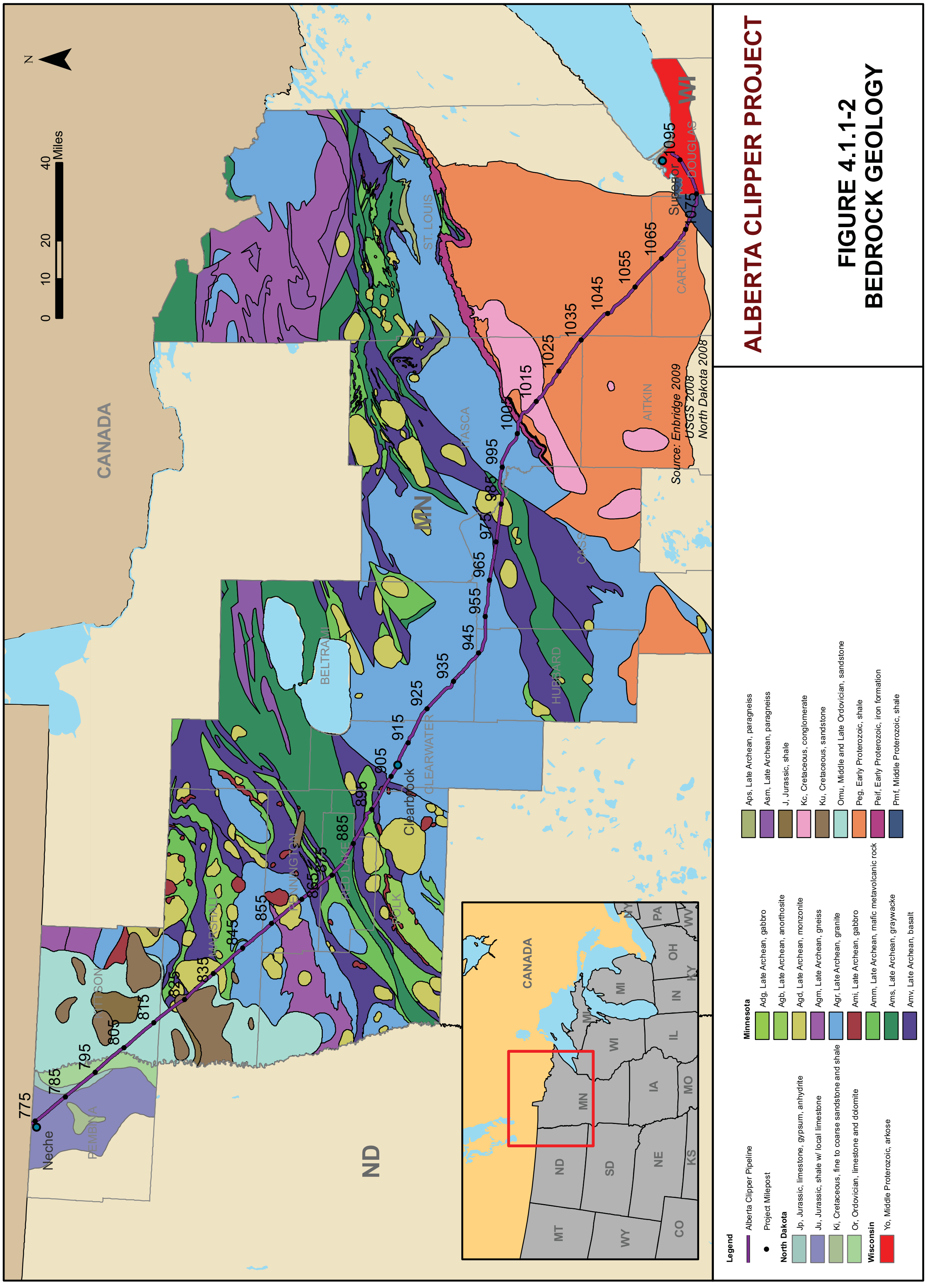
The pipeline route traverses northern Minnesota, extending from the border with North Dakota in the west to the border of Wisconsin to the east. In Minnesota, there are four basic subdivisions to the geology in the area, beginning with the youngest to oldest: Pleistocene glacial deposits; Cretaceous sediment rocks; Paleozoic rocks; and Precambrian rocks. Precambrian rocks are further subdivided by age—Proterozoic or Keweenawan (youngest), Early Proterozoic, and Archean (oldest). Pleistocene glacial deposits comprise nearly the entire land surface of Minnesota, overlying older subcropping bedrock units. These deposits consist of glacial till and glacial outwash and are typically in the range of 100 to 200 feet thick. Glacial till is a variable mixture of clay, silt, sand, and boulders having low water-bearing potential. Glacial outwash is a mix of sand and gravel with lesser amounts of silt or clay that holds a significant amount of water. The underlying bedrock is the Cretaceous sedimentary rocks, consisting primarily of poorly lithified shale, sandstone, and limestone and occurring mostly as scattered outliers or erosional remnants. Paleozoic rocks are not present in most of central Minnesota and are found mainly in the southeastern portion of the state. These sedimentary rocks consist of inter-layered sequences of sandstone, shale, and limestone. Precambrian rocks are the first bedrock encountered in most of central Minnesota. Proterozoic rocks run along the axis of Lake Superior and continue south along the Minnesota/Wisconsin border, along what is known as the Midcontinent Rift; these rocks consist primarily of basalt flows overlain by clean sandstones. The Early Proterozoic consists of a wide variety of rocks ranging from slate, schist, and gneiss to granite and gabbro. The oldest Precambrian rocks, Archean, are made up primarily of bands of various types of granites situated between linear greenstone belts and of gneiss (Boerboom No Date). As depicted in Figure 4.1.1-2, bedrock in the area of the proposed pipeline route is primarily Archean and Proterozoic (i.e., Precambrian) overlain by some Cretaceous and Ordovician sedimentary rocks.

Because the surface geology that would likely be encountered during construction of the proposed pipeline has been formed by a more recent series of glacial events, the proposed route is underlain by thick glacial deposits that are typically much greater than 5 feet in depth. Relatively thin glacial deposits and bedrock outcrops exist in St. Louis County, Minnesota in the vicinity of the Lake Superior drainage basin. Less than 1 percent of the proposed pipeline route would cross areas where bedrock would be expected at a depth of less than 5 feet, all within St. Louis County (Enbridge 2007). A review of geotechnical borings advanced at river or road crossing points in the Project area confirms the generalized description of overburden soil thickness provided above. Given the lack of seismic activity (active fault zones) under or in the vicinity of the proposed pipeline alignment, and the depth to bedrock in relation to the shallow disturbance zone of the proposed pipeline construction, bedrock type and composition are of minor importance to pipeline construction and maintenance.

The bedrock under the Wisconsin section of the pipeline right-of-way (roughly 13 miles in length) consists of Devonian dolomite or shale formations.

4.1.1.2 Paleontological Resources

Although there are no known areas of sensitive paleontological resources along the proposed route, glacial deposits similar to those being crossed by the proposed Project may contain fossils of mastodon, mammoth, horses, and Pleistocene vertebrates (Paleontology Portal No Date). Vertebrate fossils are


ALBERTA CLIPPER PROJECT
FIGURE 4.1.1-2
BEDROCK GEOLOGY
Source: Enbridge 2009
USGS 2008
North Dakota 2008
0 10 20 40
Miles
N
CANADA
ND
MN
WI
Neche
Clearbrook
Superior
PEMBINA
WALSH
MARSHALL
PENNINGTON
RED LAKE
POLK
CLEARWATER
BELTRAMI
HUBBARD
CASS
ITASCA
AITKIN
ST. LOUIS
CARLTON
DOUGLAS
775
785
795
805
815
825
835
845
855
865
875
885
895
905
915
925
935
945
955
965
975
985
995
1005
1015
1025
1035
1045
1055
1065
1075
1095
MT
WY
CO
SD
NE
KS
IA
MO
IL
IN
OH
KY
MI
WV
PA
NY
Legend
Alberta Clipper Pipeline
Project Milepost
North Dakota
Jp, Jurassic, limestone, gypsum, anhydrite
Ju, Jurassic, shale w/ local limestone
Ki, Cretaceous, fine to coarse sandstone and shale
Or, Ordovician, limestone and dolomite
Wisconsin
Yo, Middle Proterozoic, arkose
Minnesota
Adg, Late Archean, gabbro
Agb, Late Archean, anorthosite
Agd, Late Archean, monzonite
Agm, Late Archean, gneiss
Agr, Late Archean, granite
Ami, Late Archean, gabbro
Amm, Late Archean, mafic metavolcanic rock
Ams, Late Archean, graywacke
Amv, Late Archean, basalt
Aps, Late Archean, paragneiss
Asm, Late Archean, paragneiss
J, Jurassic, shale
Kc, Cretaceous, conglomerate
Ku, Cretaceous, sandstone
Omu, Middle and Late Ordovician, sandstone
Peg, Early Proterozoic, shale
Peif, Early Proterozoic, iron formation
Pmf, Middle Proterozoic, shale

relatively rare, and locations containing these fossils are more likely to be scientifically significant than those containing invertebrate or plant fossils. In areas where bedrock is exposed, fossils may be present—especially in sedimentary rocks from the Cretaceous period. The upper Cretaceous bedrock outcrops may contain fossils of marine organisms, including turtles, fish, ammonites, and various invertebrates.

4.1.1.3 Mineral Resources

Mineral resources in North Dakota, Minnesota, and Wisconsin include aggregate resources (e.g., sand, gravel, and crushed stone) and metallic minerals (e.g., iron ore, nickel, and titanium). U.S. Geological Survey (USGS) topographic maps and 2006 aerial photography were used to identify surface features possibly associated with mining or mineral resources. Table 4.1.1-2 identifies mining and mineral resource areas within 1,500 feet of the proposed pipeline route. Glacial deposits in the area of the proposed pipeline range from 5 to 450 feet in depth. These deposits represent a potentially valuable source of commercial sand and gravel. All of the localities listed are associated with non-metallic resources and include four gravel pits and six sand/gravel pits.

TABLE 4.1.1-2
Mineral Resources within 1,500 feet of the Alberta Clipper Project Route[a]

County/State	Milepost	Operation	Distance and Direction from the Right-of-Way
Beltrami, Minnesota	937.5	Sand / gravel pit[b]	650 feet southwest
	943.0	Sand / gravel pit[b]	1,300 feet east
Hubbard, Minnesota	948.0	Gravel pit	350 feet north
Itasca, Minnesota	1003.9	Gravel pit	400 feet northeast
	D1007.0	Sand / gravel pit [b]	100 feet north / 500 feet south
	1027.5	Sand / gravel pit[b]	250 feet west
St. Louis, Minnesota	1051.4	Sand / gravel pit[b]	150 feet southwest
	1052.5	Gravel pit	150 feet southwest
Carlton, Minnesota	1076.5	Sand / gravel pit[b]	250 feet north
	1080.0	Gravel pit	750 feet east

[a] Based on a review of U.S. Geological Survey (USGS) topographic maps and 2006 aerial photography.
[b] Based on interpretation of 2006 aerial photography. Not identified on USGS topographic maps.

4.1.1.4 Geologic Hazards

Seismic Hazards

The USGS Seismic Hazard Maps (USGS 2002) for the area were reviewed to assess the potential for impacts due to seismic activity in the vicinity of the proposed pipeline. The results of the review indicate that the Project area is in a seismically stable area of the country. The proposed route does not cross any active faults and would be located outside of known zones of high seismic hazard.

Landslides

Landslides typically occur on steep or convergent terrain during conditions of partial or total soil saturation. Pleistocene lacustrine clay along the lakeshores in Wisconsin is highly susceptible to earth flows and lateral spreading, although the incidence is generally low. Small and isolated slides occur primarily in excavations (Radbruch-Hall et al. 1982).

For most of the proposed Alberta Clipper route, the probability of landslides affecting the pipeline is low because of low relief and stable soil types over most of the pipeline route. Near the eastern end of the proposed route, there are areas of high landslide potential between MP 1076.3 and MP 1087.3. In addition, an area between MP 1082.4 and MP 1097.8 is described as having moderate susceptibility to landslide.

Subsidence

Subsidence, or loss of land surface elevation, can be caused by a number of conditions or events. Causes of subsidence can include dewatering of peat or organic soils, dissolution in limestone (karst), first-time wetting of moisture-deficient low-density soils (hydrocompaction), natural compaction, liquefaction, crustal deformation, subterranean mining, withdrawal of fluids (groundwater, petroleum, and geothermal), and clay soil wetting and drying cycles. No known karst features are found along the proposed pipeline route (University of Minnesota No Date).

Of the above causes, dewatering of peat or organic soils and fluid withdrawal in the vicinity of the proposed route are viewed as the only likely potential causes of ground subsidence in the pipeline right-of-way.

Floods

Floods can cause lateral and vertical scour that can expose the pipeline to damage, particularly in active channel crossings. Flood zones are further discussed in Section 4.3.2.2.

4.1.2 Potential Impacts and Mitigation

4.1.2.1 Construction Impacts

Physiography and Bedrock

The proposed Alberta Clipper Project would not involve substantial short- or long-term alteration of the existing topography and no disturbance of geologic features that have received state or federal protection. The vast majority of the Project would be constructed in areas where bedrock is deeply buried by glacial deposits. Consequently, impacts to bedrock are expected to be minimal and largely confined to areas in the eastern portion of Minnesota and western Wisconsin, where the proposed pipeline route would cross shallow bedrock. During construction, blasting may be required in locations where shallow bedrock is present; however, Enbridge does not anticipate that blasting will be required. As stated in Enbridge's Blasting Plan (Appendix L), blasting was not required for previous pipelines installed in the same corridor, and less than 1 percent of the proposed route crosses areas with the potential for shallow bedrock (bedrock within 5 feet of the ground surface). In addition to temporary effects, such as generation of dust, noise, and vibration, blasting—if conducted—would permanently alter the bedrock surface.

If blasting were warranted due to site-specific conditions, Enbridge has provided a Blasting Plan that includes requirements for transporting, storing, handling, loading, detonating, and disposing of blasting

materials (Appendix L). The plan also identifies requirements for developing a site-specific blasting plan for any area where blasting is deemed necessary. This site-specific plan would account for protection of aboveground and belowground structures (such as water mains), resources (such as threatened and endangered species), and water resources (surface water and groundwater).

Potential impacts to surface sediments and topography due to erosion and compaction are discussed in Section 4.2.2.1.

Paleontological Resources

Potential impacts to paleontological resources during construction include damage to or destruction of fossils from excavation and blasting operations, if conducted; erosion of fossil beds from grading; and unauthorized collection by construction personnel or the public. Pleistocene-age mammal fossils may be unearthed during excavation activities in the area of the proposed Project. Enbridge does not propose to recover or study any fossils discovered during the Project. If required at the eastern end of the pipeline route (i.e., St. Louis County), blasting and bedrock ripping likely would destroy any fossils found in shallow bedrock. Because it is unlikely that any scientifically significant fossils are present in the area of the proposed pipeline, Enbridge does not propose to log or recover representative fossils from the shallow bedrock locations.

However, the potential does exist for discovery of paleontological resources. Section 4.11.5 provides additional information regarding state-specific Unanticipated Discovery Plans, which describe notification procedures in the event that paleontological resources are discovered during construction activities.

Mineral Resources

Because the proposed pipeline would be installed mainly within and adjacent to an existing right-of-way, no additional restrictions on mineral resources would be expected from the proposed Project.

Geologic Hazards

Seismic Hazards

No seismic impacts are expected during the construction phase of the proposed Project because the region of the United States where the proposed pipeline would be located is relatively stable and there are no known areas of high seismic activity.

Landslides

During construction, landslide risk may be increased due to vegetation clearing and alteration of surface drainage. Measures to reduce the risk of erosion during construction (described in Section 2.2) would reduce the likelihood of construction-triggered landslides. Enbridge has committed to revegetating areas disturbed by construction along the pipeline corridor. Revegetation would reduce the risk of landslides during the operational phase of the Project. The proposed Project would be designed and constructed in accordance with 49 CFR, Parts 192 and 193. These specifications ensure that pipeline facilities are designed and constructed in a manner to provide adequate protection from washouts, floods, unstable soils, landslides, and other hazards that may cause the pipeline facilities to move or sustain abnormal loads. Proposed pipeline installation techniques, especially padding and use of rock-free backfill, are designed to effectively insulate the pipeline from minor earth movements. Enbridge plans to restore the contour of native slopes and drainage patterns, which would serve to prevent against landslides. Enbridge

has proposed erosion and sediment control and restoration procedures in the state-specific EMPs (Appendix C) that are expected to limit the potential for erosion and enable slopes to remain in a stable configuration following construction.

Subsidence

Potential impacts during construction from minor subsidence associated with soil settling and compaction in the right-of-way and proposed mitigation are discussed in Section 4.2.2.1.

Floods

There is a risk of pipeline exposure due to lateral or vertical scour at water crossings during construction. River crossing designs would be submitted to the COE for review prior to their issuing required permits. Enbridge has committed to using HDD at 22 waterbody crossings. As described in Enbridge's state-specific EMPs (Appendix C), the pipeline would be buried under a minimum of 36 inches of cover in general, according to DOT regulations. There would be a minimum of 48 inches of cover for waterbody crossings, and HDD crossings (e.g., major waterbody crossings) would generally be 30 feet or more below the stream channel. All of these actions would reduce the risk to the proposed pipeline from potential flooding events.

4.1.2.2 Operations Impacts

Overall, geologic impacts associated with routine operations and maintenance of the proposed pipeline are minimal. Routine pipeline operation and maintenance are not expected to affect physiography or bedrock geology, paleontological resources, mineral resources, or flooding.

Given the assessment of potential seismicity along the proposed corridor, the risk of pipeline rupture from earthquake ground motion during operations is considered minimal. In accordance with federal regulations (49 CFR 195), Enbridge would conduct an integrity assessment of the pipeline if an earthquake, landslide, or soil liquefaction event were suspected of causing abnormal pipeline movement. Thus, any damage to the pipeline would quickly be detected and repaired.

The potential for landslides impacting the proposed pipeline during operations is expected to be minimal.

Potential impacts during routine operations and maintenance from increased erosion and compaction in the right-of-way are discussed in Section 4.2.2.2.

Monitoring, surveillance, and detection measures for potential leaks that will be implemented during operation are discussed in Section 4.13.6. Additionally, the SPCC Plan (Appendix E) contains Enbridge's response plans in the event of a leak.

4.1.3 Connected Actions

Expansion of the Superior Terminal would require construction of five new storage tanks and a facility line to accommodate the Alberta Clipper flow. Impacts associated with construction and operation of the Superior Terminal expansion primarily would be related to wetlands. No impacts related to geological resources are expected during construction or operations of the Superior Terminal expansion.

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4.2 SOILS AND SEDIMENTS

This section describes the types and characteristics of the soils in the Alberta Clipper Project area and evaluates the potential impacts that may result from Project implementation.

4.2.1 Environmental Setting

According to the NRCS (2006), the United States has been subdivided into a number of land resource regions comprised of various major land resource areas (MLRAs). The subdivision into MLRAs is based on the similarity of climate, soils, and land use activities. The proposed pipeline route would enter the United States in the Northern Great Plains Spring Wheat Region (in North Dakota). In Minnesota, it would cross into the Northern Lake States Forest and Forage Region for the remainder of its length to Superior, Wisconsin. The only MLRA within the Northern Great Plains Spring Wheat Region that would be crossed by the pipeline route is the Red River Valley. This MLRA is characterized as a glacial lake plain bordered on the east by outwash plains, gravelly beaches, and dunes. Soils in this MLRA tend to be very deep, poorly drained, and loamy or clayey. Historically, natural prairie vegetation has been supported by these soils.

Within the Northern Lake States Forest and Forage Region, the proposed pipeline would cross through several MLRAs:

- *Northern Minnesota Gray Drift* — Soils are very deep and generally sandy to loamy. Prior to settlement, the western part of this MLRA was dominated by tall prairie grasses, and the rest of the MLRA hosted a mixture of deciduous trees and conifers.
- *Northern Minnesota Glacial Lake Basins* — Soils are very deep, sandy to clayey, and are poorly drained. There are extensive areas of organic soils in this MLRA. A large portion of the MLRA remains forested, and small areas of prairie occur in the western part of the area.
- *Superior Stony and Rocky Loamy Plains and Hills, Western Part* — Soils are dominantly dense loamy till but are also coarse glacial drift and outwash, silty glaciolacustrine sediment, local loess, alluvium, and organic material. Soils are very deep in the southern part of the MLRA through which the proposed pipeline would cross. Soils range from very poorly drained to excessively drained. This MLRA is primarily forested and encompasses public land that is managed for timber.
- *Superior Lake Plain* — The major soils are clayey to loamy till; soils in some areas along the shore of Lake Superior formed in organic material or in sandy beach deposits. This MLRA hosts deciduous and evergreen forests.

As described above, soils are highly variable along the length of the proposed Alberta Clipper Project, depending on location and parent material. In addition, some soils have been heavily modified by agriculture. The use of drainage systems and pipes (i.e., "tiles") to accelerate drainage of otherwise water-logged agricultural land is common practice. In determining the environmental impact of the proposed Project, soils with any of the following characteristics are most likely to affect or be affected by pipeline construction:

- *Highly erodible soils*—soils that are prone to high rates of erosion when exposed to wind or water by removal of vegetation.
- *Prime farmland soils*—soils with the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if they are treated and managed according to acceptable farming methods (NRCS 2007).

- *Hydric soils*—soils that are sufficiently wet near the surface to develop anaerobic conditions during the growing season.
- *Compaction-prone soils*—soils with clay loam or finer textures in somewhat poor, poor, and very poor drainage classes.
- *Stony/rocky soils*—soils with (1) a cobbly, stony, bouldery, gravelly, or shaly modifier to the textural class; or (2) more than 5 percent (weight basis) of stones larger than 3 inches in the surface layer.
- *Shallow-bedrock soils*—typically defined as soils with bedrock within 60 inches of the soil surface.
- *Drought-prone soils*—coarse-textured soils (sandy loams and coarser) that are moderately well to excessively drained.

Soil types occurring in the proposed Project area were derived from general and detailed soil maps prepared by NRCS (NRCS 2008a, 2008b, 2008c, 2008d). The soil characteristics of concern are designated as prime farmland, hydric soils, compaction potential, erosion potential (wind and water), drought-prone potential, presence of stones, shallow soil cover above bedrock, depth of topsoil, and percent slope.

Tables 4.2.1-1 and 4.2.1-2 provide summaries of soil characteristics along the proposed pipeline route by county and state. Table 4.2.1-3 summarizes the depth of topsoil for prime farmland crossed by the proposed pipeline route. Generally, topsoil thickness is greater in prairie soils than in forest soils, and wet soils typically have more topsoil than dry soils.

4.2.1.1 North Dakota

Approximately two-thirds of the soils crossed in North Dakota by the proposed pipeline route are designated as prime farmland soils and are hydric. Ninety percent of the soils in North Dakota that would be crossed by the proposed pipeline are compaction-prone soils, and 60 percent of the miles crossed in North Dakota have topsoil thickness of 18 inches or more.

The proposed pipeline would cross two parcels of EWP lands administered by NRCS. These lands are managed by NRCS for the purposes of emergency controls during drought, fire, or floods; to control runoff and soil erosion; and for the general safety of humans and livestock. Approximately 8.5 acres of designated EWP land would be located in the construction right-of-way and 1.5 acres would be located in the permanent right-of-way. Enbridge pipeline have historically extended through these parcels prior to the ERP easements being established.

TABLE 4.2.1-1
Approximate Miles of Sensitive Soils Crossed by the Alberta Clipper Project

County, State	Miles	Prime Farmland	Hydric Soils	Compaction -Prone Soils	Highly Erodible Soils: Water	Highly Erodible Soils: Wind	Drought-Prone Soils	Stony / Rocky Soils	Shallow Bedrock Soils
		Miles Crossed by Soil Type[a]							
Pembina, ND	27.9	19.2	17.7	25.2	0.0	0.0	0.0	0.0	0.0
Kittson, MN	15.4	15.1	12.7	14.2	0.0	0.0	0.0	0.0	0.0
Marshall, MN	35.1	24.9	14.7	13.0	0.2	8.9	13.3	0.0	0.0
Pennington, MN	19.6	13.1	13.8	10.3	0.0	2.7	4.9	0.0	0.0
Red Lake, MN	15.6	13.6	12.8	10.1	0.0	0.4	2.8	0.0	0.0
Polk, MN	14.0	5.3	8.0	5.2	0.3	7.0	5.6	0.0	0.0
Clearwater, MN	20.5	13.3	5.9	5.4	0.5	3.3	5.0	3.1	0.0
Beltrami, MN	22.9	0.8	2.4	1.5	0.2	18.7	20.0	3.3	0.0
Hubbard, MN	7.9	0.1	1.0	0.9	0.3	6.0	6.9	1.6	0.0
Cass, MN	34.1	3.9	9.2	8.9	0.0	26.3	21.4	0.0	0.0
Itasca, MN	50.2	17.8	23.8	20.9	0.6	24.0	9.9	0.0	0.0
Aitkin, MN	1.1	0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0
St. Louis, MN	24.7	10.8	15.0	0.0	1.8	6.3	0.4	0.2	0.1
Carlton, MN	24.0	1.0	6.5	6.5	4.2	5.9	9.7	0.3	0.0
Douglas, WI	13.2	0.0	2.1	7.2	1.4	0.0	0.0	0.0	0.0
Pipeline route total	**326.2**	**138.9**	**146.7**	**130.4**	**9.5**	**109.5**	**99.9**	**8.5**	**0.1**
Percent of total length[b]		**43%**	**45%**	**40%**	**3%**	**34%**	**31%**	**3%**	**<1%**
Leech Lake Reservation[c]		3.68	10.47	9.95	0.0	26.7	20.0	0.0	0.0

[a] Mileage does not contain areas of open water.

[b] Percentages add up to more than 100 percent total because some soils contain more than one characteristic listed in the table.

[C] Data obtained from Leech Lake Reservation and Chippewa National Forest Environmental Analysis (Appendix U).

Sources: NRCS 2008a, 2008b, 2008c, 2008d.

TABLE 4.2.1-2
Topsoil Depths and Slope Classes in the Alberta Clipper Project Area

County, State	Miles	Topsoil Depth (inches) 0-6	>6-12	>12-18	>18	Slope Class (percent) 0-5	>5-8	>8-15	>15-30	>30
		Miles Crossed by Topsoil Depth[a]				Miles Crossed by Slope Class[a]				
Pembina, ND	27.9	4.3	1.0	6.2	16.4	27.7	0.1	0.0	0.1	0.0
Kittson, MN	15.4	0.1	13.5	1.8	0.0	15.4	0.0	0.0	0.0	0.0
Marshall, MN	35.1	0.2	22.8	4.3	7.9	34.9	0.0	0.0	0.2	0.0
Pennington, MN	19.6	0.8	14.2	3.1	1.6	19.5	0.0	0.0	0.1	0.0
Red Lake, MN	15.6	0.3	15.1	0.0	0.3	15.6	0.0	0.0	0.0	0.0
Polk, MN	14.0	0.0	8.5	2.0	3.5	11.6	0.0	0.8	1.5	0.0
Clearwater, MN	20.5	8.2	10.2	0.0	2.1	18.0	0.0	2.2	0.4	0.0
Beltrami, MN	22.9	19.7	1.2	0.5	1.5	19.8	0.0	2.8	0.2	0.0
Hubbard, MN	7.9	6.0	1.0	0.0	0.8	6.0	0.1	0.6	1.2	0.0
Cass, MN	34.1	24.8	2.6	1.5	5.2	28.4	0.5	5.2	0.0	0.0
Itasca, MN	50.2	24.1	9.4	0.0	16.6	42.8	6.6	0.0	0.8	0.0
Aitkin, MN	1.1	0.0	0.0	0.0	1.1	1.1	0.0	0.0	0.0	0.0
St. Louis, MN	24.7	18.0	5.5	0.6	0.6	22.8	1.2	0.6	0.1	0.0
Carlton, MN	24.0	6.7	9.3	2.1	5.9	14.2	7.7	0.0	2.0	0.1
Douglas, WI	13.2	13.2	0.0	0.0	0.0	11.8	0.0	0.4	0.9	0.0
Pipeline route total	**326.2**	**126.4**	**114.3**	**22.1**	**63.5**	**289.6**	**16.2**	**12.5**	**7.6**	**0.1**
Percent of total length		**39%**	**35%**	**7%**	**19%**	**89%**	**5%**	**4%**	**2%**	**0%**
Leech Lake Reservation[b]		23.18	3.64	1.48	6.02[c]	29.19	0.0	5.16	0.0	0.0

[a] Mileage does not contain areas of open water.

[b] Data obtained from Leech Lake Reservation and Chippewa National Forest Environmental Analysis (Appendix U).

[c] Mileage includes both shallow and deep organic soils.

Source: NRCS 2008a, 2008b, 2008c, and 2008d.

TABLE 4.2.1-3 Topsoil Depths of Prime Farmland in the Alberta Clipper Project Area[a]					
		Topsoil Depth (inches)			
		0-6	>6-12	>12-18	>18
County, State	Miles	Miles Crossed by Topsoil Depth			
Pembina, ND	19.2	0.5	0.6	4.4	13.7
Kittson, MN	15.1	0.0	13.3	1.8	0.0
Marshall, MN	24.9	0.0	16.8	0.3	7.8
Pennington, MN	13.1	0.0	10.1	1.9	1.1
Red Lake, MN	13.6	0.0	13.6	0.0	0.0
Polk, MN	5.3	0.0	3.4	1.9	0.0
Clearwater, MN	13.3	4.6	8.6	0.0	0.0
Beltrami, MN	0.8	0.3	0.1	0.5	0.0
Hubbard, MN	0.1	0.0	0.1	0.0	0.0
Cass, MN	3.9	0.0	2.4	1.5	0.0
Itasca, MN	17.8	8.3	9.4	0.0	0.0
Aitkin, MN	0.0	0.0	0.0	0.0	0.0
St. Louis, MN	10.8	7.3	3.5	0.0	0.0
Carlton, MN	1.0	0.2	0.8	0.0	0.0
Douglas, WI	0.0	0.0	0.0	0.0	0.0
Pipeline route total	**138.9**	**21.2**	**82.7**	**12.3**	**22.6**
Percent of total length		**15%**	**60%**	**9%**	**16%**

[a] Includes land listed by the Natural Resources Conservation Service as potential prime farmland if limiting factor is mitigated (e.g., by artificial drainage).

Sources: NRCS 2008a, 2008b, 2008c, 2008d.

There are no designated contaminated sites within 0.5 mile of the proposed pipeline route in North Dakota; however, there may be remaining petroleum-contaminated soils in the pipeline right-of-way near Joliette, North Dakota associated with a crude oil spill in 1989. Subsequent monitoring at this site led to its closure by the North Dakota Department of Health (NDDH) under its regulatory authority. Petroleum-contaminated soils were encountered along this right-of-way during construction of the Enbridge LSr pipeline in 2008. Approximately 200 cubic yards of substrate were removed and disposed of at a certified facility. Based on the timing of the release 20 years ago, previous agency monitoring and site closure, as well as field observations during construction of the LSr pipeline, it is expected that any remaining contamination would primarily be bound in the clay soils. Enbridge would conduct additional site investigations at this location to characterize any contamination prior to construction to avoid or mitigate for any contamination in coordination with NDDH.

4.2.1.2 Minnesota

More than 40 percent of the soils that would be crossed by the pipeline in Minnesota are characterized as prime farmland and hydric soils. More than one-third of the soils that would be crossed are considered highly erodible by wind. The topsoil thickness for over 70 percent of the miles crossed by the proposed pipeline route in Minnesota is 12 inches or less. Although the majority of the land crossed by the proposed pipeline is less than 5 percent slope, 7.5 miles of the pipeline route is between 15 and 30 percent slope, and 0.1 mile of the route is greater than 30 percent slope in Minnesota.

Sixteen contaminated sites were identified within 0.5 mile of the pipeline route in Minnesota, including five sites identified in Itasca County. Eight unpermitted dumps were identified in Minnesota in several counties, including Pennington, Polk, Clearwater, Itasca, and Carlton. One Superfund site was identified near the City of Cass Lake, Minnesota (St. Regis Company Superfund Site at MP 954.9) that is located approximately 0.3 mile from the proposed pipeline route.

4.2.1.3 Wisconsin

Douglas County is the only county in Wisconsin that would be crossed by the proposed pipeline. Of the 13.3 miles crossed in Douglas County, half of the soils along the proposed pipeline route are compaction-prone soils. Eleven percent of the soils are highly erodible by water, and 16 percent are considered hydric soils. Much of the topsoil thickness is 6 inches or less along the proposed route, and the route generally follows relatively level ground (less than 5-percent slope). No prime farmland would be crossed in Wisconsin by the proposed pipeline.

Seven contaminated sites are located within 0.5 mile of the proposed route in Wisconsin. Five of these sites result from leaking underground or aboveground storage tanks. The additional two sites are spill sites. All of these sites are located within approximately 2 miles of each other along the proposed pipeline route (from MP 1096.3 to MP 1097.9).

4.2.2 Potential Impacts and Mitigation

4.2.2.1 Construction Impacts

Pipeline construction activities, including clearing, grading, trench excavation, backfilling, heavy equipment traffic, and restoration, along the construction right-of-way may adversely affect soil resources. Potential impacts include temporary and short-term soil erosion, short-term to long-term soil compaction, permanent increases in the proportion of large rocks in the topsoil, and short-term to permanent soil contamination. Pipeline construction also may result in damage to existing tile drainage systems. In the state-specific EMPs (Appendix C), Enbridge has proposed construction procedures that are designed to minimize the likelihood and severity of these impacts and to mitigate where impacts are unavoidable.

Clearing of the construction right-of-way would remove protective vegetative cover and could increase soil erosion and its transport to sensitive areas. Approximately 36 percent of the overall Project construction area would involve soils listed as highly erodible, either by wind or water. In these areas, some temporary and short-term increases in soil erosion may occur. In the state-specific EMPs (Appendix C), Enbridge has proposed construction methods that are designed to minimize impacts resulting from soil erosion. These methods include installation of sediment barriers, temporary slope breaks, and trench breakers and distribution of temporary mulch in the event that construction activities are interrupted. As described in the EMPs, Enbridge would designate at least one Environmental Inspector per construction spread, who would have the authority to stop work or order corrective action in

the event that construction activities violate the provisions of the EMPs, landowner requirements, or any applicable permit. The Environmental Inspector would inspect temporary erosion control measures on a daily basis in areas of active construction or equipment operation. In addition, the Environmental Inspector would inspect areas without active construction or equipment operation on a weekly basis, and within 24 hours of continuous rainfall greater than 0.5 inch or after each snowmelt that produces runoff equivalent to 0.5 inch of rainfall. Enbridge would monitor weather conditions on a daily basis using online climate services that provide a daily status of weather conditions using data from existing weather stations in the vicinity of the proposed route. Additionally, rain gauges would be placed along the right-of-way at select locations, including existing pump stations, meter stations, and pipe/material yards. These rain gauges would be checked following rain events. The Environmental Inspector would have the authority to ensure the repair of any ineffective erosion control measures within 24 hours of detection and would keep records of compliance with provisions of Enbridge's Construction Environmental Control Plan (Appendix M) and applicable regulations and permits.

In North Dakota, the proposed pipeline route would cross two parcels of EWP lands. As discussed in Section 4.9, the Applicant would restore EWP lands to their pre-construction condition.

In northwestern Minnesota, there is also a concern related to anthrax spores in soils. Soil disturbance activities in areas with susceptible animals could uncover spores, which could possibly cause animals to become infected. Enbridge has developed an Anthrax Mitigation Plan (Appendix I) to address this potential, including surveys of landowners to determine whether their property has been associated with any historical outbreaks. Enbridge would work with the landowners to mitigate the potential risk, possibly by fencing off the disturbed right-of-way on the properties for 2 years or vaccinating the animals. Enbridge also would notify local veterinarians and feed lot operators near anthrax-affected properties of the proposed construction activities and work with them to develop a plan of action to protect livestock.

The structure of farmland soils could be degraded by construction. Grading and equipment traffic may compact soil, reducing porosity and percolation rates, which could result in increased runoff potential. As detailed in Enbridge's AMP (Appendix F), Enbridge has proposed construction methods that are designed to minimize these impacts. These include removing and storing the top 12 inches of topsoil east of the Red River Valley and 18 inches of topsoil within the Red River Valley from the trench line and any areas to be graded, ripping to relieve compaction in all areas from which topsoil has been removed, removing all excess rocks exposed due to construction activity, and adding soil amendments to return topsoil as warranted by conditions and agreed to by landowners. As stated in the AMP, Enbridge would compensate landowners or tenants for any demonstrated damages caused during construction and restoration activities.

Although Enbridge plans to minimize impacts to soil productivity that may result from construction activities, some short- to long-term decreases in agricultural productivity are possible. Farmland within the proposed right-of-way would be removed from production for the duration of construction. Agricultural production on approximately 2,285.3 acres would be lost from the construction right-of-way for the construction season. An additional 243.5 acres located within extra temporary workspaces and pipe and contractor yards would also be removed from production during construction. During the next growing season, crop production could be reduced, but it would not be expected to be completely lost. Long-term productivity is not expected to be impaired. As summarized in the AMP (Appendix F), Enbridge would negotiate with landowners or tenants who assert claims for construction-related damages in accordance with the terms of the easement agreements; claims may include demonstrated losses from decreased productivity resulting from pipeline operations.

Construction and maintenance activities may lead to localized soil compaction in soils listed as hydric or compaction prone, regardless of their suitability for farming. This compaction may lead to slower or less

successful vegetation reestablishment following construction. Approximately 45 percent of the overall proposed route is characterized by hydric soils, and 40 percent of the overall proposed route is characterized by compaction-prone soils. Hydric and otherwise compaction-prone soils are particularly sensitive to the impact of construction activities during wet weather. Enbridge's state-specific EMPs (Appendix C) address the methodology to be utilized to determine when to restrict or stop work for wet weather and the methods to mitigate impacts of construction activities in wet conditions. The EMPs take into account the depth of rutting by reference to whether rutting may cause mixing of soil horizons, on a location-specific basis. A "stop work" decision would be implemented at the discretion of the Environmental Inspector. The EMPs also address construction procedures and mitigative measures to minimize compaction in wet conditions.

Construction may result in concentration of large clasts (fragments of rock) near the surface in areas where rocky soil or near-surface bedrock is found. Locations along the proposed right-of-way where stony/rocky soils are found are listed in Table 4.2.1-1; they are limited in extent. As detailed in the AMP (Appendix F), Enbridge has proposed construction methods to ensure that the surface substrate along the proposed route does not become rockier due to pipeline construction. These methods include topsoil removal, segregation and redistribution after construction, and removal and off-site disposition of excess rocks and rock fragments from the right-of-way. In short, the AMP commits Enbridge to restore the right-of-way soils to approximately pre-construction conditions. The minimum burial depth would be 3 feet below ground surface, which would be sufficient to prevent potential impacts from frost heave along the length of the proposed Project.

During winter construction, some topsoil may be removed as slabs of frozen soil that extend to the frost depth. As discussed in Section 2.4.3.1, Enbridge would limit the amount of frost formed over the proposed trench lines by leaving an insulating mound of snow over the trench centerlines. During trenching, the excavated topsoil may also freeze. To minimize backfilling with frozen material, which could result in voids, Enbridge would limit the amount of open ditch in winter work areas to no more than about 14,000 feet. This would limit the time the trench is open and the excavated spoil material is exposed to aboveground temperatures. Large frozen blocks of spoil material would be broken into smaller pieces during the backfilling process to limit the size of voids created by ice and frozen spoil.

In forested areas, Enbridge would remove the top organic layer where feasible following stump and root removal and ensure that the soil is replaced in the order that it was removed (i.e., first out, last in). Topsoil segregation in forested areas would be conducted in the same manner as in upland areas. As discussed in state-specific EMPs (Appendix C), cleanup and rough grading (including installation of temporary erosion and sediment control measures) would begin within 72 hours after backfilling. To the maximum extent practical, the top organic layer would be returned to the surface of forest soils to enable proper regeneration of plant species.

During construction, potential equipment spills or leakage of fuels, lubricants, and coolants could affect soils. Enbridge has proposed construction methods that would minimize these impacts. These procedures include proper storage and disposal of all hazardous and non-hazardous wastes generated during the construction process, use of controlled staging areas for refueling and hazardous material loading/unloading operations, provision of adequate spill cleanup materials and equipment, and contingency plans for spills that may pose a danger to human health or the environment, as described in Enbridge's SPCC Plan (Appendix E). In the event that a spill does occur and causes damage to soil productivity, Enbridge's easement agreements with landowners would require Enbridge to restore the productivity of the right-of-way and compensate landowners or tenants for demonstrated losses associated with decreased productivity resulting from pipeline construction and operation. Impacts would be mitigated in compliance with applicable federal, state, tribal, and local cleanup standards.

It is also possible that Enbridge could discover previously contaminated soils during construction. In that event, Enbridge would stop work immediately, contact the appropriate state or tribal agency, and consult with the agency with respect to an acceptable plan of action in accordance with Enbridge's Petroleum-Contaminated Soil Management Plan (Appendix J). While Enbridge may elect to remediate areas of pre-existing contamination, Enbridge may not be responsible for such remediation and, in most cases, would develop a route deviation to avoid the contaminated area. Enbridge also would notify the landowner if contamination is discovered.

In the case of the existing St. Regis Superfund site (located at MP 954.9), the proposed route has been moved approximately 1,000 feet to the north of the northern boundary of the Superfund site. The re-route has been placed in a location where impacted soil is not believed to be present based on current delineation efforts. Additionally, Enbridge plans on collecting soil samples along the proposed route adjacent to the site prior to construction activities. Enbridge proposes to use HDD methods for the Pike Bay Crossing, which is located approximately 3,000 feet northeast of the Superfund site. Based on subsurface conditions, contaminants from the Superfund site are not expected to be encountered during HDD activities. As an added precaution, Enbridge plans on collecting soil and groundwater samples from appropriate depths to assess the presence of any contamination prior to construction.

In the case of the existing St. Regis Superfund site (located at MP 954.9), the proposed route is approximately 1,000 feet to the north of the northern boundary of the Superfund site. This route is in a location where impacted soil is not believed to be present based on current delineation efforts. Enbridge proposes to use HDD methods for the Pike Bay Crossing, which is located approximately 3,000 feet northeast of the St. Regis Superfund site. Soil samples were collected in December 2008 near the crossing and results were below detection limits for all contaminants. Based on subsurface conditions, contaminants from the Superfund site are not expected to be encountered during HDD activities.

Construction of the proposed pipeline would, in places, necessitate disruption of existing drain tile systems. In the state-specific EMPs (Appendix C), Enbridge has committed to identifying and avoiding, repairing, or replacing drainage tiles that may be damaged by pipeline construction. Although these procedures should eliminate or compensate for any long-term impacts to drain tile function, unavoidable temporary impacts would be experienced during construction. As summarized in the AMP (Appendix F), Enbridge's easement agreements with landowners would require Enbridge to restore the productivity of the right-of-way and compensate landowners or tenants for demonstrated losses associated with decreased productivity resulting from pipeline operation, including flooding that could occur because of disruption of drain tile systems.

In summary, Enbridge would implement the following mitigation measures for soils and sediments:

- Topsoil would be removed, stockpiled, and respread at all heavily disturbed areas not needed for maintenance access; and excess rocks would be removed. Enbridge would restore the right-of-way soils to pre-construction conditions.
- Cultivated fields and compacted or rutted areas would be tilled with a deep tillage device or chisel plowed to loosen compacted soils.
- Sediment barriers, temporary slope breaks, and trench breakers would be installed to minimize impacts to surface waterbodies from erosion.
- Erosion control measures would be implemented on disturbed areas, including areas that must be used for maintenance operations (access roads and areas around aboveground structures).
- When no longer required, construction roads and other disturbed areas would be restored to their original condition. Surfaces of these areas would be scarified to facilitate natural

revegetation, provide for proper drainage, and prevent erosion. If revegetation is required, Enbridge would provide native seed mixes.

- Enbridge has proposed construction methods that would minimize impacts relating to potential equipment spills and leaks.
- Enbridge has committed to identifying and avoiding, repairing, or replacing drainage tiles that may be damaged by pipeline construction.
- The potential for soil subsidence will be reduced by limiting the time that trenches are open and the excavated spoil material is exposed to aboveground temperatures.

4.2.2.2 Operations Impacts

Operational maintenance of cleared areas may lead to increased erosion by wind or water. Maintenance activities may lead to localized compaction due to vehicular traffic. Incidental soil contamination due to minor leaks from maintenance vehicles also may occur. None of these impacts are expected to be extensive or severe. In the event that agricultural productivity is impaired, Enbridge's easement agreements with landowners would require Enbridge to restore the productivity of the right-of-way and compensate landowners or tenants for demonstrated losses associated with decreased productivity resulting from pipeline operation.

Potential impacts to soil resources from the accidental release of transported oil are discussed in Section 4.13.5.2. As described in Section 4.13.5.2, Enbridge employs a number of leak detection methods that meet and exceed the requirements under 49 CFR Part 195. These detection methods are equally effective across all soil types. Should a leak occur, it would be reported to federal and state agencies immediately. Depending on the impact of the incident, Enbridge would be required to prepare a remediation plan, which would be developed with special attention to and sensitivity posed by the specific soil types, groundwater flows, drinking water sources, and environmental receptors.

Enbridge also analyzed the potential effects on crop yields from increased soil temperatures caused by the elevated temperature of the oil in the pipeline, especially immediately downstream from pump stations. First, Enbridge reviewed available literature on soil warming associated with gas pipelines. According to these studies, the presence of a gas pipeline results in warmer soils adjacent to the pipeline; however, no significant adverse crop impacts were documented (Enbridge 2007). Soil heating from the Alberta Clipper pipeline to the surrounding soil would be less than natural gas pipelines because the operating temperatures are lower. Data from natural gas pipelines that operate at higher temperatures than the proposed Alberta Clipper pipeline would operate suggest that crop impacts associated with the Alberta Clipper Project would be minor. Based on this information, the Alberta Clipper pipeline could result in minor highly localized changes related to frost depth and soil moisture; however, these changes would not be expected to be unfavorable or affect crop yields.

Additionally, as part of its study, ground and pipeline temperatures that would be representative of Enbridge's crude oil pipelines were collected at Minnesota Pipe Line pumping stations. Ground and pipeline temperatures collected at Minnesota Pipe Line pumping stations that were considered representative of the Enbridge crude oil pipelines associated with pump stations in Minnesota indicate that the ambient ground temperature is only a few degrees cooler than the pipeline temperatures throughout the year. Temperature differences between the pipe and saturated soils/sediments in wetlands and waterbodies would be even less due to the high thermal mass of water-saturated soils and sediments (Enbridge 2007).

4.2.3 Connected Actions

Construction impacts to soils associated with expansion of the Superior Terminal could result from clearing, grading, excavation, heavy equipment traffic, and restoration activities. Since the proposed location is within an industrial facility, mitigation measures would not necessarily be required for impacts related to soil productivity. However, best management practices (BMPs) would be implemented during construction and operation to minimize potential impacts associated with soil erosion and stabilization. There is the potential for an accidental leak or spill, although the Superior Terminal Expansion Project would have an SPCC Plan and an ERP to minimize the likelihood of a spill, limit the extent and duration of a spill if it were to occur, and remediate any soil impacts. Enbridge would continue to implement the programs and processes in place for the present operation to minimize and avoid environmental impacts.

4.2.4 References

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NRCS. See Natural Resources Conservation Service.

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4.3 WATER RESOURCES

This section describes the groundwater and surface water resources in the Alberta Clipper Project area that could be affected by the proposed Project and evaluates potential impacts that may result from Project implementation. The analysis focuses on major aquifers and wells in the vicinity of the pipeline route, as well as streams and rivers that would be crossed.

4.3.1 Environmental Setting

4.3.1.1 Groundwater

The proposed Alberta Clipper Project route is primarily located within the Central Lowland, Western Lake physiographic province (Vigil et al. 2000). The Central Lowlands physiographic province is characterized by glacial terrain. Buried stream channels, sand and gravel deposits, and glacial till were deposited following glacial retreat. Shallow groundwater often is contained in the buried stream channels or in recently deposited stream alluvium. Deeper wells have been constructed into bedrock aquifers; however, the pipeline and associated construction activities are not likely to affect deeper groundwater aquifers because of the presence of glacial till above these zones. Glacial till typically inhibits the downward migration of groundwater.

Groundwater is the primary source of drinking water for municipal populations and essentially the only source for rural populations. Groundwater occurs in aquifers, which are saturated deposits that are permeable enough to transmit water. The primary aquifers in the Project area are either bedrock or glacial aquifers. Bedrock aquifers are comprised of water-bearing deposits beneath a wide range of rock types and ages. Glacial aquifers are comprised of water-bearing deposits of unconsolidated material above bedrock, which can be considered surficial or buried. Surficial drift aquifers occur above the bedrock in unconsolidated sediments deposited by glaciers, meltwater runoff, and lakes. The depth of the unconsolidated material may reach several hundred feet in some areas (Adolphson et al. 1981). Surficial aquifers are an important source of groundwater for much of the northern half of the Project area (Enbridge 2007).

Buried glacial drift aquifers occur in well sorted sands and gravel deposits called "outwash," which is the material washed out of glaciers by meltwater (Hutchinson 1977); these outwash deposits subsequently were covered by fine glacial till to form one or more confining layers, creating the aquifer. Glacial drift aquifers tend to be more productive (yielding more water) than bedrock aquifers. The thickness of the buried sand and gravel deposits typically is less than 30 feet but may be up to 150 feet. Buried sand and gravel aquifers yield sufficient water quantities for domestic use and are an important source of drinking water (MPCA 1999). Well yields range from approximately 10 to 1,000 gallons per minute (gpm) (Adolphson et al. 1981). The confining layer generally protects the aquifer from contamination resulting from human activity at the surface.

A sole source aquifer is an underground water supply designated by EPA as the "sole or principal" source of drinking water for an area. The proposed Alberta Clipper Project pipeline route would not overlie any sole source aquifers, as designated by EPA.

Major aquifers and wells in the vicinity of the proposed Project route are described below.

North Dakota

Aquifers

Groundwater resources in North Dakota occur in two principal aquifer types: unconsolidated glacial deposits and sedimentary bedrock (NDDH 1999). In Pembina County, the only county crossed by the pipeline in North Dakota, the principal bedrock aquifer[1] is the Paleozoic-age Red River-Winnipeg Aquifer.

This Paleozoic-age aquifer is present beneath MP 798.1 to MP 801.9 in northeastern North Dakota and northwestern Minnesota, approximately underlying the Red River drainage basin in the area of the proposed pipeline route. The Red River-Winnipeg Aquifer consists mostly of limestone and dolomite; because the water typically has large concentrations of dissolved solids, it is seldom used for drinking water (Whitehead 1996).

Water Supplies and Wells

Enbridge (Enbridge 2007) reports that there are no domestic wells within 200 feet of the proposed pipeline route in North Dakota, according to the North Dakota State Water Commission database (the nearest well is over 500 feet from the proposed right-of-way). Additionally, no public water supplies would be crossed by the proposed Alberta Clipper Project route, according to review of available information on public drinking water supplies through EPA and WDNR (Enbridge 2007).

Minnesota

Aquifers

Fourteen different principal aquifers in Minnesota supply water to half the municipal population and to nearly all of the rural population of the state (Adolphson et al. 1981). The Alberta Clipper Project would cross three principal aquifers in Minnesota: the Lower Cretaceous Aquifer, the Cambrian-Ordovician Aquifer, and the Precambrian Undifferentiated Aquifer.

Lower Cretaceous Aquifer (Minnesota). The Lower Cretaceous Aquifer is present beneath MP 809.3 to MP 817.8 (Kittson County) in western Minnesota and beneath MP 1010.9 to MP 1018.9 (Itasca County) in north central Minnesota. The aquifer is present in sandstone lenses beneath sections of gray, soft, argillaceous shale. The aquifer is present at depths ranging from 280 to 620 feet below ground surface (bgs) and is under confined conditions. Pumping wells typically yield from 10 to 250 gpm, with yields up to 1,000 gpm. Water is typically for small-scale rural and domestic use; however, the aquifer is a major source of water locally southwest of the Minnesota River (Adolphson et al. 1981).

Cambrian-Ordovician Aquifer (Minnesota and Wisconsin). The Cambrian-Ordovician Aquifer is present beneath MP 1077.6 to MP 1097.8 in Minnesota and Wisconsin. The aquifer is present beneath a regional confining unit that inhibits surficial recharge to the aquifer. The aquifer system is a collection of individual aquifers that collectively are separated by leaky confining units. Groundwater is withdrawn from this aquifer in southeastern Wisconsin, Iowa, and Illinois. Water quality is good and suitable for water supply.

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1 "Principal aquifer" is defined as a regionally extensive aquifer or aquifer system with the potential to be used as a source of potable water (USGS 2003).

Precambrian Undifferentiated Aquifer (Minnesota). The Precambrian Undifferentiated Aquifer underlies the entire State of Minnesota and consists of fractures, faults, and weathered zones present in granite, greenstone, and slate rock. Water yield is generally low but is greater in areas where bedrock is overlain by thick drift (Adolphson et al. 1981). The aquifer is reported to yield limited supplies of water to rural domestic and livestock wells. The aquifer is present at depths ranging from 30 to 450 feet bgs. Wells typically yield from 5 to 25 gpm, with yields up to 100 gpm. Calcium magnesium bicarbonate water is common, and concentrations of total dissolved solids are typically less than 300 milligrams per liter.

Water Supplies and Wells

There are 27 domestic wells within 200 feet of the pipeline route in Minnesota, according to the Minnesota Geologic Survey, the Minnesota Department of Health water well information database (County Well Index), and the State Water Commission database (Enbridge 2007). If cased wells were located within 100 feet of the construction right-of-way, Enbridge would develop site-specific plans for domestic wells to maintain water quality and quantity during and following construction or to provide an interim source of water if the water supply was interrupted during construction (Enbridge 2007).

LLBO has indicated surficial aquifers are an important source of drinking water on the reservation. During a landowner survey, one water well was identified within 100 feet of the proposed pipeline at MP 993.9, within the LLR. The well was abandoned and a new well was installed at a distance greater than 100 feet from the proposed pipeline (Enbridge 2009).

According to the Minnesota Department of Health water well database, one public water supply well is within 200 feet of the proposed pipeline (Chub Lake Park Well No. 1, located in Carlton County) (Enbridge 2007). In addition, the proposed pipeline route crosses portions of two drinking water supply management areas for the cities of Grand Rapids and Oklee and a portion of the Wellhead Protection Area for the city of Grand Rapids well field.

Wisconsin

Aquifers

There are three major types of principal aquifers in Wisconsin: the unconsolidated sand and gravel aquifer, the Silurian dolomite aquifer, and the sandstone aquifer. In Douglas County, the only county through which the Alberta Clipper pipeline would cross in Wisconsin, the principal aquifer type is the unconsolidated sand and gravel aquifer, which overlies much of the state. It is comprised of numerous discontinuous layers, lenses, terraces, and valley fillings of sand and gravel. The water table in this aquifer is generally within 50 feet of the ground surface. Wells in this aquifer are generally less than 100 feet deep, and generally water yields are between 10 and 100 gpm (USGS 1985). However, the majority of the county's drinking water is supplied from surface water rather than groundwater (Ellefson et al. 2000).

Water Supplies and Wells

There are 31 domestic wells[2] within 500 feet of the pipeline route in Wisconsin, according to a review of aerial photos and land use maps.

[2] Because public information was limited, the ownership of some of these wells could not be confirmed.

4.3.1.2 Surface Water

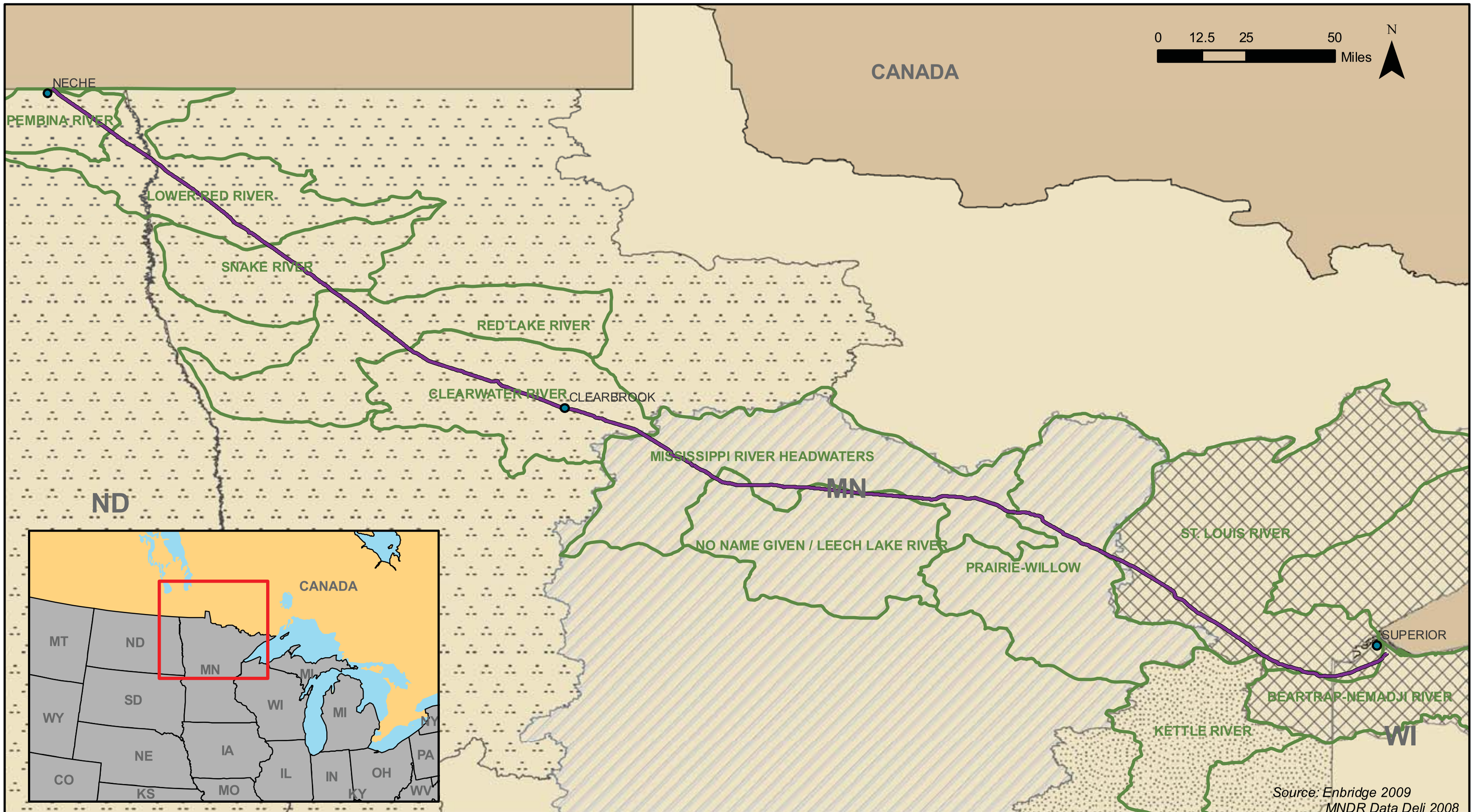
Drainage Basins

A "drainage basin" refers to an area of land that funnels water from rain or snowmelt to a specific body of water, such as a river or lake. The basins and watersheds through which the pipeline would cross are described below in sequential order as the route progresses south and east from the U.S./Canada border to its terminus in Superior, Wisconsin. Table 4.3.1-1 presents a summary of drainage basins and watersheds crossed by the proposed pipeline route (also see Figure 4.3.1-1).

TABLE 4.3.1-1
Drainage Basins and Watersheds Crossed by the Alberta Clipper Project Pipeline Route

Basin Name	Watershed Name	Milepost In	Milepost Out	Crossing Length (miles)
Red River of the North	Lower Red River	773.8	774.7	0.9
	Pembina River	774.7	790.1	15.4
	Lower Red River	790.1	834.0	43.9
	Snake River	834.0	851.6	17.6
	Red Lake River	851.6	873.9	22.3
	Clearwater River	873.9	925.6	51.7
Upper Mississippi	Mississippi River - Headwaters	925.6	944.1	18.5
	No Name Given / Leech Lake River[a]	944.1	951.5	7.4
	Mississippi River - Headwaters	951.5	962.9	11.4
	No Name Given / Leech Lake River[a]	962.9	971.7	8.8
	Mississippi River - Headwaters	971.7	974.3	2.6
	No Name Given / Leech Lake River[a]	974.3	982.5	8.2
	Mississippi River - Headwaters	982.5	1005.4	22.9
	Prairie-Willow	1005.4	1026.8	21.4
Lake Superior	St. Louis River	1026.8	1069.6	42.8
St. Croix River	Kettle River	1069.6	1069.7	0.1
Lake Superior	St. Louis River	1069.7	1078.9	9.2
	Beartrap-Nemadji River	1078.9	1083.2	4.3
	St. Louis River	1083.2	1095.8	12.6
	Beartrap-Nemadji River	1095.8	1097.8	2.0

[a] Agencies use different names for this watershed. USGS lists it as the No Name Given Watershed while MDNR lists it as the Leech Lake River Watershed (USGS 2008, MDNR 2008).



Legend

- Alberta Clipper Pipeline
- Watershed

Drainage Basins

- Red River of the North
- Upper Mississippi
- Lake Superior
- St. Croix River

ALBERTA CLIPPER PROJECT

FIGURE 4.3.1-1
MAJOR DRAINAGE BASINS AND WATERSHEDS

Red River of the North Basin

This 39,199-square-mile basin (U.S. portion) drains to the Red River of the North (USGS 2006). The Red River is the second largest river in North Dakota, after the Missouri River (NDDH 1999); it flows north into Manitoba, Canada, and forms the state border between North Dakota and Minnesota. Nearly 70 percent of the land in the U.S. portion of the drainage basin is used for cropland, pasture, or rangeland; and another 26 percent of the land is comprised of forests, open water, and wetlands (USGS 2006). The five watersheds in the drainage basin through which the proposed pipeline would cross are North Dakota's Lower Red River and Pembina River and Minnesota's Snake River, Red Lake River, and Clearwater River. The Snake River Watershed is approximately 785 square miles, contains 66 acres of lakes and 8,863 acres of wetlands, and is located between approximately 770 and 1,233 feet above sea-level (asl). The Red Lake River Watershed is approximately 1,319 square miles, includes 1,929 acres of lake habitat and 121,493 acres of wetland habitat, and is located between approximately 795 and 1,274 feet asl. The Clearwater River Watershed is 1,385 square miles, contains 22,462 acres of lake habitat and 61,599 acres of wetlands, and is located between approximately 941 and 1,624 feet asl (MDNR 2008). The proposed pipeline route would cross through three Level III Ecoregions in this drainage basin: the Lake Agassiz Plain (a.k.a. "Red River Valley"), North Central Hardwood Forests, and Northern Lakes and Forests (EPA 2008a, Stoner et al. 1998).

Upper Mississippi River Basin

This 20,100-square-mile basin includes the drainage area to the upper Mississippi River. The Upper Mississippi River Basin begins in Minnesota and includes the headwaters to the Mississippi River, as well as two other major rivers: the Minnesota and the St. Croix. The basin includes a mixture of forests, prairie, agriculture, and urban land areas. The three watersheds in the Upper Mississippi River Basin through which the proposed pipeline would cross are the Mississippi River Headwaters, the No Name Given / Leech Lake River, and the Prairie-Willow. All three watersheds lie within the Northern Lakes and Forests Ecoregion, which is characterized by numerous conifer and hardwood forests (MPCA 2000). The Mississippi River Headwaters Watershed is approximately 1,961 square miles, contains 180,286 acres of lake habitat and 196,522 acres of wetland habitat, and is geologically located between approximately 1,242 and 1,952 feet asl. The No Name Given / Leech Lake River Watershed is 1,335 square miles, includes 168,807 acres of lakes and 139,650 acres of wetlands, and is located between approximately 1,280 and 1,834 feet asl. The Prairie-Willow Watershed is 2,075 square miles, contains 75,689 acres of lake habitat and 397,971 acres of wetlands habitat, and is located between approximately 1,200 and 1,731 feet asl (MDNR 2008).

Lake Superior Basin

This 6,200-square-mile basin flows to Lake Superior. Lake Superior is approximately 31,700 square miles in size and is the deepest, coldest, and largest of all the great lakes. It is also the largest freshwater lake in the world (MPCA 1997). The St. Louis River is the largest U.S. tributary to Lake Superior (EPA 2008b). The lower 21 river miles of the St. Louis River include a 12,000-acre freshwater estuary (Figure 4.14.2-1) (St. Louis River Citizens Action Committee 2002). Forest covers much of the land area in the Lake Superior basin, and there is very little agriculture due to the cool climate and poor soils. The Lake Superior Basin contains extensive wetlands and waterbodies, primarily due to the vast peatlands, located in the central region of the St. Louis River Watershed (MPCA 1997).

The two watersheds in the Lake Superior Basin through which the proposed pipeline would cross are the St. Louis River and the Beartrap-Nemadji River, which lie within the Northern Lake and Forests Ecoregion (EPA 2008c, MPCA 1997). The St. Louis River Watershed is approximately 2,853 square miles, contains 55,572 acres of lake habitat and 557,997 acres of wetland habitat, and is located between

approximately 595 and 1,942 feet asl. The Beartrap-Nemadji River Watershed is 278 square miles, contains 1,845 acres of lake habitat and 16,197 acres of wetland habitat, and is located between approximately 683 and 1,360 feet asl (MDNR 2008).

St. Croix River Basin

This 7,760-square-mile basin is located in Minnesota and Wisconsin, extending from near Mille Lacs Lake in Minnesota east to near Cable, Wisconsin (MPCA No Date). The one watershed in the St. Croix River Basin through which the proposed pipeline would cross is the Kettle River. The Kettle River Watershed is the most northern part of the St. Croix River Basin, and is within the Northern Lake and Forests Ecoregion (EPA 2008c). The Kettle River Watershed is approximately 1,050 square miles, contains 11,978 acres of lake habitat and 101,893 acres of wetlands habitat, and ranges in elevation from 820 to 1,440 feet asl (MDNR 2008).

Stream and River Crossing Methods

The number and types of waterbodies that would be crossed by the Alberta Clipper Project, as proposed by Enbridge, are presented below by state in sequential order from the U.S./Canada border south and east to its terminus in Superior, Wisconsin. Streams are classified according to USGS topographical quadrangles as perennial, intermittent, or seasonal (also known as “ephemeral”). Perennial streams or rivers hold water at all times, except in cases of extreme drought; intermittent streams are wet only during part of the year, usually in spring when rain and snow melt saturate the ground surface; and seasonal or ephemeral streams flow only during or immediately following a rain event or heavy snow melt. The proposed Project would also cross non-jurisdictional ditches/drains, which refer to waterbodies that do not require a permit to cross and specific waterbody details, such as flow, are not available. The width, waterbody type, and aquatic inhabitants of each waterbody are key criteria in considering the proper method of stream crossing (e.g., open-cut, dry crossing [dam-and-pump or flume], HDD, open-cut/push-pull, push-pull, or road bore methods). As part of the application process, Enbridge conducted waterbody surveys along the length of the proposed pipeline route. The results of this field effort yielded site-specific information about individual waterbodies at the proposed point of crossing. This information, as well as the proposed method of crossing for each waterbody is presented in Appendix P. Currently, 15 waterbodies are pending surveys that would provide information used in determining Enbridge’s proposed crossing method.

The waterbody crossing methods indicated in Appendix P were proposed by Enbridge based on agency consultation, regulatory protection, biological communities present in each waterbody, and engineering issues. Site-specific reviews of each waterbody crossing included depth to bedrock and soil characteristics; available workspace; access conditions; and the depth, width, and flow of the waterbody. As part of its permitting process, the COE determines the crossing method that is the LEDPA. Appendix P includes information on currently proposed crossing methods for the proposed Project and the Diluent Project. A summary discussion of each type of crossing method is presented in Section 2.4.3.2.

Waterbody crossing methods have been proposed in consultation with the COE but will not be finalized until COE permits and/or state certifications and licenses have been issued.

Waterbodies Crossed

The sections below describe general waterbodies, sensitive or protected waterbodies, and impaired waterbodies that would be crossed by the pipeline and their designated use classifications. Section 303(c) of the CWA requires that each state review, establish, and revise water quality standards for all surface

waters within the state. Each state crossed by the proposed Alberta Clipper Project has developed beneficial use classification systems to describe the designated use(s) for each waterbody in the state. Minimum water quality requirements are linked with the designated uses of listed surface waterbodies within the state. According to Section 303(d) of the CWA, states must report biennially to EPA their list of waterbodies that do not meet EPA-approved water quality standards. These waters are considered "impaired" and are consequently on the "303(d) list." Waterbodies that meet these water quality standards, but that are not likely to meet water quality standards the next time the 303(d) list is due, are considered "threatened."

North Dakota. A total of 27 waterbodies would be crossed in North Dakota along the proposed Alberta Clipper Project route (Appendix P). Three of these waterbodies are classified as perennial streams or rivers, while the rest of the waterbodies are classified as intermittent, seasonal, or non-jurisdictional. The three perennial waterbodies that would be crossed by the proposed route are the Pembina River, the Tongue River Cutoff, and the Tongue River. Of these three perennial waterbodies, the Pembina River and the Tongue River have specific water quality and use designations, as described below. North Dakota's four beneficial use designations assessed for 303(d) listing are whether the water quality supports aquatic life, recreation, drinking water, and fish consumption. Any waterbodies on the 303(d) list are considered impaired to some degree and are mentioned below.

The following streams and rivers along the Alberta Clipper Project route in North Dakota contain state water quality designations or use designations according to the NDDH (2001):

- Pembina River (MP 775.5) – Class IA waterbody: "The quality of the waters in this class shall be the same as the quality of Class I streams, except that treatment for municipal use may also require softening to meet drinking water requirements."
- Tongue River (MP 786.2) and Tongue River Cutoff (MP 783.3) – Class II waterbodies: "The quality of the waters in this class shall be the same as the quality of Class I streams, except that additional treatment may be required to meet drinking water requirements, and these streams may be intermittent."

All other unnamed or minor waterbodies within North Dakota are designated as Class III waterbodies, which means they are suitable for agricultural and industrial uses but generally have low average flows and possibly prolonged periods of no flow and are therefore of limited value for recreation, fish life, and aquatic biota (NDDH 2001).

Additionally, the Pembina River is listed in the Nationwide Rivers Inventory (NRI), which is a database of river segments that possess exceptional natural or cultural values. The NRI is maintained by the National Park Service (NPS) Rivers, Trails and Conservation Assistance Program. When conducting an environmental review of an action, all federal agencies must strive to avoid or mitigate actions that would adversely affect one or more NRI segments, in accordance with a 1979 Presidential directive.

A waterbody that does not meet applicable water quality standards or fully support the applicable beneficial uses due to pollution from point or non-point sources is considered impaired. According to North Dakota's 2008 Integrated Water Quality Assessment Report list of impaired waters (NDDH 2008), segments of two rivers crossed in North Dakota are impaired: the Pembina River and the Tongue River (Table 4.3.1-3). The Pembina River contains elevated levels of metals and total fecal coliform, and excessive sedimentation or siltation from its confluence with a tributary west of Neche, North Dakota downstream to its confluence with the Tongue River. The designated uses of this nearly 33-mile stretch are fish and other aquatic biota, and municipal and domestic and recreation [uses]—which are all fully supported but threatened. A 22.5-mile stretch of the Tongue River, from its confluence with a tributary

northeast of Cavalier, North Dakota downstream to its confluence with Big Slough, is designated to support fish and other aquatic biota but is not currently supporting this use due to sedimentation and siltation.

Minnesota. As presented in Appendix P, 177 waterbody crossings are proposed in Minnesota along the proposed Alberta Clipper Project route. Approximately 35 percent of the crossings (76) would involve perennial waterbodies, while the remainder would involve intermittent, seasonal, or non-jurisdictional waterbodies. Fifteen waterbodies have not yet been surveyed. Most of the waterbodies to be crossed are listed as canals, ditches, or tributaries—many as "unnamed."

Table 4.3.1-2 summarizes the protected waterways in Minnesota that would be crossed by the proposed pipeline. Protected public waters and wetlands in Minnesota (defined in Minnesota Statute 103G.005, Subd. 15 and identified in the MDNR Public Waters Inventory Maps) are subject to Minnesota Statutes Section 103G.245. MPCA reports that ditches are considered waters of the state, subject to the same rules and legal protections as other waters of the state as per Minnesota Statute Section 115.01, Subdivision 22. Minnesota statutes require that a crossing license be obtained prior to alteration of the course, current, or cross section of these waters. However, a MDNR public waters permit is not required.

Protected waterways, rivers listed in the NRI, navigable waters, and recreational canoe rivers are identified in Table 4.3.1-2. Five waterbodies that would be crossed are listed in the NRI: Middle River, Red Lake River, Clearwater River, Red River, and Prairie River. For additional information on protected waterbodies to be crossed on the LLR and in the CNF, see Appendix U.

Minnesota has identified seven classes of beneficial use designations for surface waterbodies that are defined in Minnesota Rule 7050.0140. These include drinking water (Class 1), aquatic life and recreation (Class 2), industrial use and cooling (Class 3), agricultural irrigation and livestock and wildlife watering (Class 4), aesthetics and navigation (Class 5), other uses and protection of border waters (Class 6), and limited resource value waters (Class 7). Limited resource value waters are defined as such because they are unable to support aquatic life due to lack of water, lack of habitat, or extensive physical alterations. Essentially, all surface waters are classified and protected for aquatic life and recreation (Class 2), unless they are classified as limited resource value waters (Class 7). Minnesota Rule 7050.0222 defines the water quality standards for the following subclasses of Class 2 waters:

- 2A Cold-water fisheries, trout waters, also protected as a source of drinking water;
- 2B Aquatic community and aquatic recreation (not protected for drinking water);
- 2Bd Aquatic community and aquatic recreation, also protected as a source of drinking water;
- 2C Indigenous fish and associated aquatic community (not protected for drinking water); and
- 2D Wetlands (not protected for drinking water).

Minnesota has designated numerous streams in the southern and northeastern parts of the state as trout streams (Class 2A), which are subject to restrictions that are implemented to protect and foster the propagation of trout (Minnesota Rule 6264.0050). The following waterbodies that are designated as trout streams would be crossed by the proposed Alberta Clipper route:

- Beltrami County: Clearwater River, Tributary to Clearwater River;
- Hubbard County: Necktie River, Tributaries (two crossings) to Necktie River; and
- Carlton County: Little Otter.

TABLE 4.3.1-2
Minnesota Designated Protected Waters on Alberta Clipper and Southern Lights Diluent Pipeline Projects Route (wetlands and waterbodies)[a]

ID Number	Public Waterbody Name (Wetlands designated in bold & italic font)	Section	Township	Range	¼, ¼ Section	County	Alberta Clipper Proposed Crossing Method (Alternative)[b]	Alberta Clipper CROW Crossing Width (feet)[c]	Alberta Clipper Crossing Length (feet)	Southern Lights Diluent Proposed Crossing Method (Alternative)[b]	Southern Lights Diluent CROW Crossing Width (feet)[c]	Southern Lights Diluent Crossing Length (feet)	Approx. MP	Site- Specific Map Date	Comments
Public Water and Public Water Wetland Crossings Northwest of Clearbrook – Department of Natural Resources Region 1 (Northwest)															
Construction Spread 1															
1	Red River (s-801a)	4	160	50	SW/SE	Kittson	HDD	--	500	NA	NA	NA	801.7	3/24/2009	
2	unnamed coulee/ Tributary to Red River (Tributary to Red River) (s-805a)	23	160	50	NE/SE	Kittson	DC (OC)	125	10	NA	NA	NA	805.4	3/24/2009	
3	Tamarac River (s-828a)	16	157	47	SE/SW	Marshall	HDD (DC)	--	50	NA	NA	NA	828.7	3/24/2009	
4	Middle River (s-836a)	18	156	46	NW/NE	Marshall	HDD (DC)	--	30	NA	NA	NA	835.9	3/24/2009	
5	Snake River (s-843a)	12	155	46	NW/NE	Marshall	HDD	--	30	NA	NA	NA	843.2	3/24/2009	
6	South Branch of the Snake River (s-847a)	28	155	45	NE/NW	Marshall	DC (OC)	125	20	NA	NA	NA	847.2	3/24/2009	
7	3W (w-853a)	18	154	44	SW/SE	Pennington	OC	125	878	NA	NA	NA	853.5	3/24/2009	
8	Red Lake River (s-864b)	29	153	43	NW/SE	Pennington	HDD (OC)	--	170	NA	NA	NA	864.3	3/24/2009	Recreational Canoeing River
9	Tributary to Red Lake River (s-866a)	4	152	43	NW/NW	Pennington	DC (OC)	125	25	NA	NA	NA	866.1	3/24/2009	
10	Tributary to Red Lake River (west side) (s-869b)	14	152	43	NE/SW	Pennington	DC (OC)	125	20	NA	NA	NA	869.5	3/24/2009	
11	Clearwater River (s-875a)	9	151	42	NE/NW	Red Lake	HDD (DC)	--	60	NA	NA	NA	875.4	3/24/2009	

TABLE 4.3.1-2 (continued)
Minnesota Designated Protected Waters on Alberta Clipper and Southern Lights Diluent Pipeline Projects Route (wetlands and waterbodies)a

							Alberta Clipper			Southern Lights Diluent					
ID Number	Public Waterbody Name (Wetlands designated in bold & italic font)	Section	Township	Range	¼ ¼ Section	County	Proposed Crossing Method (Alternative)[b]	CROW Crossing Width (feet)[c]	Crossing Length (feet)	Proposed Crossing Method (Alternative)[b]	CROW Crossing Width (feet)[c]	Crossing Length (feet)	Approx. MP	Site- Specific Map Date	Comments
Public Water and Public Water Wetland Crossings Northwest of Clearbrook – Department of Natural Resources Region 1 (Northwest) (continued)															
Construction Spread 1 (continued)															
12	Lost River (s-885a)	1	150	41	NW/NW	Red Lake	DC	125	70	NA	NA	NA	885.8	3/24/2009	
Construction Spread 2															
13	Lost River (s-904a)	15	149	38	NW/SW	Clearwater	DC	125	18	NA	NA	NA	904.0	3/24/2009	Pending final determination
14	Silver Creek (s-907a)	25	149	38	SE/NE	Clearwater	DC	125	20	NA	NA	NA	907.1	3/24/2009	
15	Silver Creek (s-907b)	30	149	37	SW/NW	Clearwater	DC	125	12	NA	NA	NA	907.4	3/24/2009	
16	Silver Creek (s-907c)	30	149	37	SW/NW	Clearwater	DC	125	15	NA	NA	NA	907.7	3/24/2009	
17	Intermittent Tributary to Silver Creek (s-909b)	29	149	37	SE/SW	Clearwater	DC	125	7	NA	NA	NA	909.1	3/24/2009	
Public Water and Public Water Wetland Crossings Southeast of Clearbrook – Department of Natural Resources Region 1 (Northwest)															
18	Tributary to Ruffy Brook (s-913b)	3	148	37	SE/NE	Clearwater	DC (OC)	125	20	DC (OC)	125	20	912.9	3/24/2009	
19	Ruffy Brook (s-8r915b)	12	148	37	SE/NE	Clearwater	DC	125	15	GB (DC)	--	15	915.2	3/24/2009	Pending final determination
20	West Four Legged Lake 28P (s-8r916x)	17	148	36	NE/NE	Clearwater	HDD	--	822	HDD	--	822	916.6	3/24/2009	
21	East Four Legged Lake 27P (w-8r917b)	16 15	148 148	36 36	NE/SE NW/SW	Clearwater	OC/PP	125	822	OC/PP	125	822	917.7	3/24/2009	

TABLE 4.3.1-2 (continued)
Minnesota Designated Protected Waters on Alberta Clipper and Southern Lights Diluent Pipeline Projects Route (wetlands and waterbodies)a

ID Number	Public Waterbody Name (Wetlands designated in bold & italic font)	Section	Township	Range	¼, ¼ Section	County	Alberta Clipper: Proposed Crossing Method (Alternative)[b]	Alberta Clipper: CROW Crossing Width (feet)[c]	Alberta Clipper: Crossing Length (feet)	Southern Lights Diluent: Proposed Crossing Method (Alternative)[b]	Southern Lights Diluent: CROW Crossing Width (feet)[c]	Southern Lights Diluent: Crossing Length (feet)	Approx. MP	Site- Specific Map Date	Comments
Public Water and Public Water Wetland Crossings Southeast of Clearbrook – Department of Natural Resources Region 1 (Northwest) (continued)															
22	Tributary to Clearwater River (s-922a)	29	148	35	SW/NW	Beltrami	DC	125	30	DC	125	30	922.3	3/24/2009	Trout Stream
23	Clearwater River (s-922b)	29	148	35	SW/NW	Beltrami	DC	125	70	DC (OC)	125	70	922.3	3/24/2009	Trout Stream; pending final determination
24	382P (w-8r926a)	11	147	35	NE/NW NW/NE SE/NE	Beltrami	OC	140	2,721	OC	140	2,721	926.8	3/24/2009	Alternative: non-frozen
25	Grant Creek (s-927a)	11	147	35	SE/NE	Beltrami	OC/PP	140	1,010	OC/PP (OC)	140	1,010	927.2	3/24/2009	Alternative: non-frozen
26	Grant Creek (s-930a)	19	147	34	NE/NE	Beltrami	DC	125	79	GB (DC)	--	79	929.8	3/24/2009	
27	Grant Creek (s-8r932x)	33	147	34	SW/NE	Beltrami	DC	125	330	GB (DC)	--	330	932.9	3/24/2009	
28	Grant Creek (s-8r933x)	3	146	34	NW/NW	Beltrami	DC	125	500	GB (DC)	--	500	933.7	3/24/2009	
29	Mississippi River (s-939a)	20	146	33	SE/NE	Beltrami	HDD (DC)	--	190	HDD (DC)	--	190	939.7	3/24/2009	Recreational Canoeing River
30	Tributary to the Necktie River (s-944a)	1	145	33	SE/NW	Hubbard	OC	125	600	GB (OC)	--	600	944.4	3/24/2009	Trout Stream
31	Tributary to the Necktie River (s-8r946a)	7	145	32	NW/NW	Hubbard	OC	125	240	GB (OC)	--	240	945.5	3/24/2009	Trout Stream

TABLE 4.3.1-2 (continued)
Minnesota Designated Protected Waters on Alberta Clipper and Southern Lights Diluent Pipeline Projects Route (wetlands and waterbodies)a

							Alberta Clipper			Southern Lights Diluent					
ID Number	Public Waterbody Name (Wetlands designated in bold & italic font)	Section	Township	Range	¼, ¼ Section	County	Proposed Crossing Method (Alternative)[b]	CROW Crossing Width (feet)[c]	Crossing Length (feet)	Proposed Crossing Method (Alternative)[b]	CROW Crossing Width (feet)[c]	Crossing Length (feet)	Approx. MP	Site- Specific Map Date	Comments
Public Water and Public Water Wetland Crossings Southeast of Clearbrook – Department of Natural Resources Region 1 (Northwest) (continued)															
32	Necktie River (s-947a)	8	145	32	NE/SE	Hubbard	DC (OC/PP)	125	18	DC (OC/P P)	125	18	947.2	3/24/2009	Trout Stream
33	Pike's Bay Channel (s-955a)	15	145	31	NE/NE	Cass	HDD	--	100	HDD	--	100	955.8	3/24/2009	
Construction Spread 3															
34	Upper Sucker Lake 316P (s-964a)	19	145	29	NW/NW	Cass	PP (OC)	125	300	GB (OC)	--	300	964.2	3/24/2009	On state land parcel #14
35	922P (w-973a)	27 28	145 145	28 28	NW/SW NE/SE	Cass	OC	140	2,080	OC	140	2,080	973.1	3/24/2009	On state land parcel #27; alternative: non-frozen
36	Mississippi River (s-8r985x)	3	144	26	NE/NW	Cass	HDD	--	50	HDD	--	50	986.0	3/24/2009	Recreational Canoeing River
37a	Mississippi River (s-8r986x)	3	144	26	NE/NW	Cass	HDD	--	30	HDD	--	30	986.1	3/24/2009	
37b	Mississippi River (s-8r986x)	3	144	26	NW/NE	Cass	HDD	--	30	HDD	--	30	986.1	3/24/2009	
Department of Natural Resources Region 2 (Northeast)															
38a	Ball Club River Secondary Channel (s-989b)	31	145	25	NW/SE	Itasca	HDD	--	30	HDD	--	30	989.4	3/24/2009	

TABLE 4.3.1-2 (continued)
Minnesota Designated Protected Waters on Alberta Clipper and Southern Lights Diluent Pipeline Projects Route (wetlands and waterbodies)a

							Alberta Clipper			Southern Lights Diluent					
ID Number	Public Waterbody Name (Wetlands designated in bold & italic font)	Section	Township	Range	¼, ¼ Section	County	Proposed Crossing Method (Alternative)[b]	CROW Crossing Width (feet)[c]	Crossing Length (feet)	Proposed Crossing Method (Alternative)[b]	CROW Crossing Width (feet)[c]	Crossing Length (feet)	Approx. MP	Site- Specific Map Date	Comments
Department of Natural Resources Region 2 (Northeast) (continued)															
38b	Ball Club River Crossing (s-989a)	31	145	25	NW/SE	Itasca	HDD	--	80	HDD	--	80	989.5	3/24/2009	
39	Deer River (s-995a)	21	56	27	NW/NE	Itasca	HDD	140	30	HDD	140	30	995.3	3/24/2009	Alternative: non-frozen
40	Bass Brook (s-8r1004x)	2	55	26	SE/SW	Itasca	DC (OC)	125	125	GB (DC)	--	125	1004.21	3/24/2009	
41	Prairie River (s-1011a)	14	55	25	NW/NW	Itasca	HDD	--	400	HDD	--	400	1010.0	3/24/2009	
42	(w-8r1013c)	30 30 31	55 55 55	24 24 24	SW/SW SE/SW NE/NW	Itasca	OC	125	1,130	OC	125	1,130	1013.4	3/24/2009	
43	Tributary to Mississippi River (s-8r1016a)	4	54	24	NE/SW	Itasca	DC (OC)	125	15	GB (DC)	--	15	1016.1	3/24/2009	
44	Swan River (s-1025a)	33	54	23	SW/NE	Itasca	DC (OC)	125	100	GB (DC)	--	100	1024.2	3/24/2009	
Construction Spread 4															
45	Bruce Creek (s-1029c)	12	53	23	SW/SE	Itasca	RB (DC)	--	12	GB (DC)	--	12	1028.2	3/24/2009	Alternative: winter
46	Tributary to Floodwood River (s-1045b)	1	51	21	NE/SE	St. Louis	OC	140	150	GB (OC)	--	150	1045.0	3/24/2009	Alternative: winter
47	Savanna River (s-1046b)	7	51	20	NW/SW	St. Louis	DC (OC)	140	45	DC (OC)	140	45	1046.0	3/24/2009	Alternative: non-frozen

TABLE 4.3.1-2 (continued)
Minnesota Designated Protected Waters on Alberta Clipper and Southern Lights Diluent Pipeline Projects Route (wetlands and waterbodies)a

ID Number	Public Waterbody Name (Wetlands designated in bold & italic font)	Section	Township	Range	¼, ¼ Section	County	Alberta Clipper: Proposed Crossing Method (Alternative)[b]	Alberta Clipper: CROW Crossing Width (feet)[c]	Alberta Clipper: Crossing Length (feet)	Southern Lights Diluent: Proposed Crossing Method (Alternative)[b]	Southern Lights Diluent: CROW Crossing Width (feet)[c]	Southern Lights Diluent: Crossing Length (feet)	Approx. MP	Site- Specific Map Date	Comments
Department of Natural Resources Region 2 (Northeast) (continued)															
Construction Spread 4 (continued)															
48	Tributary to the St. Louis River (s-8r1050x)	27	51	20	SW/NW	St. Louis	DC (OC)	140	30	GB (DC)	--	30	1050.1	3/24/2009	Alternative: non-frozen
49	Tributary to the St. Louis River (s-8r1051x)	35	51	20	NE/SW	St. Louis	DC (OC)	125	15	GB (DC)	--	15	1052.0	3/24/2009	
50	Ahmik River (Mirbat Creek) (s-8r1052x)	2	50	20	NE/NE	St. Louis	DC (OC)	125	22	GB (DC)	--	22	1052.7	3/24/2009	
51	Tributary to Little Otter Creek (s-1073a)	6	48	17	SW/SE	Carlton	OC/PP	125	10	OC	--	10	1071.2	N/A	
52	Little Otter Creek (s-1076a)	16	48	17	SE/NE	Carlton	DC (OC)	140	15	DC (OC)	140	15	1074.3	3/24/2009	Trout Stream; alternative: non-frozen

[a] Protected water designation based on maps and county lists found on: http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html.

[b]
OC = Open cut. Similar to dry crossings, waterbodies that are proposed for open cut but have perceptible flow at the time of crossing will be crossed via a dry crossing method.
DC = Dry crossing (dam-and-pump or flume). Waterbodies that are dry or have no perceptible flow will be crossed using the open-cut/wet-trench technique. The technique will be determined based on site conditions at the time of crossing.
GB = Guided bore.
HDD = Horizontal directional drill.
OC/PP = Open cut/push-pull.
RB = Road bore.
NA = Not applicable.

[c] The construction right-of-way (CROW) southeast of Clearbrook represents combined right-of-way for both Alberta Clipper and Southern Lights Diluent Projects; for cases in which guided bore is used for the Southern Lights Diluent Project, the entire CROW is attributed to Alberta Clipper.

In addition, all Minnesota surface waters in the Lake Superior Basin, other than Class 7 waters and designated Outstanding Resource Value Waters, are designated as outstanding international resource waters (Minnesota Rule 7052.0300).

Nine waterbodies (totaling 12 crossings) are considered impaired to some degree. Table 4.3.1-3 lists the impaired waterbodies that would be crossed by the pipeline and the reasons they are considered impaired on the 2008 MPCA 303(d) list (MPCA 2008).

Wisconsin. As presented in Appendix P, 14 waterbody crossings in Wisconsin are proposed along the Alberta Clipper Project route. These waterbody crossings consist of the perennial Pokegama River and some of its tributaries.

All Wisconsin surface waters are considered appropriate for the protection of fish and other aquatic life by default, while others have one or more "official" use designations (i.e., fish and aquatic life[3], recreation, public health and welfare, and wildlife), according to Chapter NR 102 of the Wisconsin Administrative Code (WDNR 2008a). The Pokegama River is designated for recreation and fish and aquatic life according to Chapter NR 104.22 of the Wisconsin Administrative Code (WDNR 2004). The existing biological use of the most upstream 3-mile section of the Pokegama River is classified as suitable for limited forage fish communities, due to inputs from unspecified non-point source pollution. The uses for the most downstream 21 miles of the river have not been assessed (WDNR 2008b). Additionally, the Pokegama River is known to contain viable wild rice habitat near the confluence with the St. Louis River. Prior to construction, Enbridge would consult with interested tribes and obtain appropriate permits from the state, if necessary.

A "designated water" is a waterbody with special designations that affects permit requirements. Special designations (WDNR 2008c) include the following:

- Areas of Special Natural Resource Interest (ASNRI) – Includes trout streams; outstanding or exceptional resource waters; waters inhabited by endangered, threatened, or species of special concern; and wild and scenic rivers.
- Public Rights Features (PRF) – Waterbodies with sensitive areas such as fish and wildlife habitat necessary for breeding, nesting, nursery, and feeding—as well as physical features that ensure protection of water quality; areas navigated by recreational watercraft used in such activities as boating, angling, hunting, or enjoying natural beauty.
- Priority Navigable Waters (PNW) – A navigable waterway (or a portion of one) that is identified as an outstanding or exceptional resource water (s. 281.15, Stats), a trout stream, a lake that is less than 50 acres, or waters that the WDNR has determined contain sensitive fish and aquatic habitat. This category also includes waterbodies classified as ASNRI and PRF.

Three proposed waterbody crossings in Wisconsin are classified as designated waters. These include the Pokegama River (MP 1094.4), a tributary to the Pokegama River (MP 1094.4), and an unnamed waterbody (MP 1097.0). All of these waterbodies are designated as ASNRI. The proposed Project does not cross any PRF-or PNW-designated waterbodies.

The Alberta Clipper Project route would not cross any waterbodies within Wisconsin that are listed as impaired or contaminated on the 2008 303(d) list.

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[3] Subcategories of the fish and aquatic life designation are cold water communities (which includes trout streams), warm water sport fish communities, warm water forage fish communities, limited forage fish communities, and limited aquatic life. All surface waters are classified as one of these subcategories.

TABLE 4.3.1-3
Proposed Crossing of Impaired Waters

Waterbody	County	Milepost	Designated Use	Use Support[a]	Reason for Impairment	Proposed Crossing Method[b] – Alberta Clipper	Proposed Crossing Method[b] – Diluent	Justification for Crossing Method
Pembina River	Pembina, ND	775.5	Fish/Aquatic Biota, Recreation, Municipal and Domestic	Fully supporting but threatened	Cadmium, copper, lead, selenium, sedimentation/ siltation, benthic-fishes, bioassessments, fecal coliform	HDD	N/A[c]	HDD – No disturbance will occur.
Tongue River "cutoff"	Pembina, ND	783.3	Fish/Aquatic Biota	Not supporting	Sedimentation/siltation, benthic-fishes, bioassessments	OC	N/A[c]	The turbidity that is likely to occur from construction will be limited because the instream activity will be completed within 24 hours as specified in the state-specific Environmental Mitigation Plan (Appendix C).
Red River	Pembina, ND/ Kittson, MN	801.7	Aquatic Consumption	5A	Mercury, pcb	HDD	N/A[c]	HDD – No disturbance will occur.
Tamarac River	Marshall, MN	828.7	Aquatic Life	5C	Fish bioassessments	HDD	N/A[c]	HDD – No disturbance will occur.
Middle River	Marshall, MN	853.9	Aquatic Life	5A	Dissolved oxygen, turbidity	HDD	N/A[c]	HDD – No disturbance will occur.
Judicial Ditch # 25, Branch 3 (Black River)	Pennington, MN	855.0	Aquatic Life	5A	Dissolved oxygen, turbidity	DC	N/A[c]	The impairment to this waterbody is a result of runoff from the surrounding agricultural areas. The turbidity from construction will be limited to a small plume that would occur when the dams are removed after construction.
Red Lake River	Pennington, MN	864.3	Aquatic Consumption	4A	Mercury	HDD	N/A[c]	HDD – No disturbance will occur.
Clearwater River	Red Lake, MN	875.4	Aquatic Consumption, Aquatic Life, Aquatic Recreation	5B	Dissolved oxygen, turbidity, mercury, fecal coliform	HDD	N/A[c]	HDD – No disturbance will occur.
Lost River	Red Lake, MN	885.8	Aquatic Recreation	5C	Fecal coliform	DC	N/A[c]	The impairment is based on an animal or human waste flow into the aquatic system. The proposed construction method will not result in an increase of this impairment.

TABLE 4.3.1-3 (continued)
Proposed Crossing of Impaired Waters

Waterbody	County	Milepost	Designated Use	Use Support[a]	Reason for Impairment	Proposed Crossing Method[b] Alberta Clipper	Proposed Crossing Method[b] Diluent	Justification for Crossing Method
Silver Creek	Clearwater, MN	907.1, 907.4, 907.7	Aquatic Recreation	5C	Fecal coliform	DC	N/A[c]	The impairment is based on an animal or human waste flow into the aquatic system. The proposed construction method will not result in an increase of this impairment.
Ruffy Brook	Clearwater, MN	915.2	Aquatic Recreation	5C	Fecal coliform	DC	GB	GB – No disturbance will occur. DC – The impairment is based on an animal or human waste flow into the aquatic system. The proposed construction method will not result in an increase of this impairment.
Clearwater River	Beltrami, MN	922.3	Aquatic Consumption	4A	Mercury	DC	DC	The proposed construction method will not result in an introduction of additional mercury into this aquatic system. The substrate at this location is sand, and disturbance of these soils is not anticipated to result in a release of additional mercury into the aquatic system.
Swan River	Itasca, MN	1024.2	Aquatic Consumption, Aquatic Life	5B	Mercury, dissolved oxygen	DC	GB	GB – No disturbance will occur. DC - The proposed construction method will not result in an introduction of additional mercury into this aquatic system. The proposed construction will result in a small temporary sediment plume with the removal of the dams; however, this is not anticipated to impact the dissolved oxygen levels.

a Use Support Definitions for Minnesota
4A: Impaired or threatened but all needed total maximum load (TMDL) plans have been completed.
5A: Impaired or threatened by multiple pollutants and no TMDL plans have been approved.
5B: Impaired or threatened by multiple pollutants and either some TMDL plans approved but not all, or at least one impairment is the result of natural conditions.
5C: Impaired or threatened by one pollutant.

b OC – Open cut.
DC – Dry crossing (dam-and-pump or flume).
GB – Guided bore.
HDD – Horizontal directional drill.

c The 20-inch Diluent Project pipeline will not be installed across this waterbody.

* No impaired waters would be crossed in Wisconsin.

Source: MPCA 2008.

4.3.2 Potential Impacts and Mitigation

4.3.2.1 Groundwater

Construction Impacts

Potential impacts to groundwater during construction activities include:

- Temporary increases in total suspended solids (TSS) concentrations where the water table is disturbed during trenching and excavation activities (drawdown of the aquifer is possible where dewatering is warranted);
- Degradation of groundwater quality because of blasting; and
- Groundwater quality degradation during or after construction resulting from disposal of debris[4], or vehicle spills and leaks.

Total Suspended Solids Concentrations

Although there is potential for dewatering of shallow groundwater aquifers and potential changes in groundwater quality (such as increases in TSS concentrations) during trenching, excavation, and backfilling activities, these changes are expected to be temporary. Shallow groundwater aquifers generally recharge quickly because they are receptive to recharge from precipitation and surface water flow.

Implementation of measures described in the state-specific EMPs (Appendix C) would reduce erosion of soil or sediment and control surface water runoff during construction activities near waterbodies. These measures include installation of slope breakers, sediment barriers, trench breakers, and mulch. Additionally, following significant rainfall events, construction activities would be suspended to prevent erosion of exposed slopes, as warranted by site-specific conditions.

Blasting

Where required for pipeline construction, blasting has the potential to affect groundwater resources. However, less than 1 percent of the proposed pipeline route crosses areas of shallow bedrock (within 5 feet of the ground surface), and this is in St. Louis County, Minnesota. Enbridge does not expect blasting to be part of its construction activities.

If blasting were warranted due to site-specific conditions, Enbridge has provided a Blasting Plan (Appendix L) that includes requirements for transporting, storing, handling loading, detonating, and disposing of blasting materials. The plan also identifies requirements for developing a site-specific blasting plan for any area where blasting is deemed necessary. This site-specific plan would account for protection of aboveground and belowground structures, such as water mains, threatened and endangered species, and water resources (surface water and groundwater).

Spill and Leak Prevention Measures

Overall, it is not anticipated that long-term groundwater quality would be affected by standard construction activities. Many of the aquifers present in the subsurface beneath the proposed route are

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4 Debris associated with construction can come in various forms, as discussed throughout the Applicant's state-specific EMPs in Appendix C of the FEIS.

isolated by the presence of glacial till, which characteristically inhibits downward migration of water and contaminants into these aquifers; however, some shallow or near-surface aquifers are also present beneath the proposed route.

Implementation of the procedures outlined in Enbridge's SPCC Plan (Appendix E) would help to prevent spills and releases of fuels and other hazardous materials into the environment. The SPCC Plan highlights procedures for the proper storage and handling of fuels and hazardous liquids, spill management, and spill containment and cleanup. Implementation of procedures outlined in the SPCC Plan would ensure that contractors would be prepared to respond to any spill incident. These measures are designed to contain all contaminants and not allow them to migrate into the aquifer during construction activities, regardless of the depth of the underlying aquifer.

Groundwater Availability

Construction activities are not expected to have long-term impacts on the availability of groundwater resources. The subsurface that is disturbed or excavated during trenching is above the water table of the majority of the regional surficial aquifers; however, if shallow surficial aquifers are encountered during these activities, they are expected to result in only short-term fluctuations of groundwater levels. Groundwater levels typically would recover in a short period following completion of construction activities.

Operations Impacts

During the operation of the Alberta Clipper Project, potential minor short-term groundwater quality degradation would be possible from equipment and vehicle spills or leaks. Routine operation and maintenance is not expected to affect groundwater resources; however, if a petroleum product release occurred, petroleum product could migrate into subsurface aquifers and into areas where these aquifers are used for water supplies.

Enbridge's SPCC Plan (Appendix E) describes measures to be taken to prevent spills, safely store fuels and hazardous materials, and minimize impacts in the event of a release during construction. The Enbridge ERP (Appendix Q) describes procedures to address such incidents as leaks and natural disasters that may occur during pipeline operation, in addition to decontamination and cleanup procedures. The risk of petroleum releases from the proposed pipeline, an assessment of the potential environmental impacts associated with petroleum releases, and the preventative and response measures in Enbridge's SPCC Plan and ERP are described in Section 4.13.

4.3.2.2 Surface Water

Construction Impacts

Potential impacts to surface water resources during construction activities include:

- Temporary increases in TSS concentrations and increased sedimentation during stream crossings;
- Temporary to short-term degradation of aquatic habitat from instream construction activities;
- Increased surface water runoff and erosion from clearing vegetation in the right-of-way;
- Changes in channel morphology and stability caused by channel and bank modifications;

- Temporary reduced flow in streams and potential other adverse effects during hydrostatic testing activities;
- Temporary degradation of surface water quality and alteration of aquatic habitat from blasting activities within or adjacent to stream channels; and
- Temporary to long-term surface water quality degradation during or after construction from debris or vehicle spills and leaks.

Stream Crossings and Instream Construction Activities

The degree of impact from construction activities depends on flow conditions, stream channel conditions, and sediment characteristics. If the proposed Project is approved and implemented, Enbridge will work with the applicable regulatory agency to develop specific crossing procedures and will provide DOS with a copy of that consultation for crossings of contaminated or impaired waters, waterbodies within 1 mile upstream of HCAs, and sensitive/protected waterbodies,. The same protective methods that would be implemented to minimize impacts from construction to other waterbodies would also be followed for these types of waters. If additional mitigation requirements are identified, they would be specified in permits prior to commencing construction.

Prior to commencing any waterbody or wetland crossing associated with the proposed Project, Enbridge would need to show the COE that the proposed crossing methods for each waterbody crossing constitute the LEDPA to obtain COE authorization. In addition, Enbridge would need to obtain a Rivers and Harbor Act (RHA) Section 10 permit for Minnesota.

Enbridge has applied for a permit with the COE for RHA Section 10. While no waterbodies in North Dakota or Wisconsin would require an RHA permit, the following Minnesota waterbodies would require an RHA Section 10 permit:

- Red River of the North;
- Red Lake River in Red Lake County and Pennington County;
- Pike's Bay Channel (Cass Lake) in Beltrami County; and
- Mississippi River.

In accordance with applicable permit requirements, all waterbody crossings would be assessed by qualified personnel in the final design phase of the Project with respect to the potential for vertical channel degradation and lateral channel migration. The level of assessment for each crossing would vary based on the professional judgment of the qualified design personnel. Additionally, personnel would consult with each COE office with jurisdiction and with state resource agencies prior to making these determinations. The design of the crossings also would include the specification of appropriate stabilization and restoration measures including, but not limited to, the proper installation of slope breakers and erosion control fabric to minimize impacts from erosion and allow replanted vegetation to grow and stabilize the banks of the waterbody.

In order to avoid the construction problems that occurred on previous Enbridge projects, erosion control measures and mitigation would be improved by implementing updated mitigation methods described in the state-specific EMPs and providing contractor oversight during all phases of a waterbody crossing in order to ensure compliance during both construction and restoration.

In accordance with the CWA, all construction activities would comply with the NPDES permit and other applicable permitting; this includes following procedures in Enbridge's SWPPP, which would be required at the permitting stage. As discussed in Section 4.7.4, Enbridge also would adhere to state agency construction timing window recommendations.

Enbridge would implement the waterbody crossing procedures and mitigation methods included in the state-specific EMPs (Appendix C). These include minimizing the distance to cross the streams by designing crossings as close to perpendicular to the stream channel axis as possible, and installing temporary sediment control measures, such as silt fences and straw bales, to minimize the potential for disturbed soils to enter the waterbody from the construction right-of-way. The EMPs would be updated prior to construction to incorporate any additional mitigation, as well as any other mitigations or conditions that COE imposes during final permit negotiations.

Depending on the type of stream crossing, one of six construction methods would be used: open-cut, dry crossing (dam-and-pump or flume), HDD, open-cut/push-pull, push-pull, or road bore methods. These methods are described in Sections 2.4.3.2 and 2.4.3.4. A comprehensive summary of proposed and alternate crossing methods for each waterbody is provided in Appendix P.

Enbridge proposes to cross the majority of waterbodies (i.e., all intermittent streams and agricultural ditches) using a dry crossing method (dam-and-pump, flume). Open-cut crossings would be minimized except when conditions permit the use of this method (i.e., dry or no perceptible flow at the time of construction). Under dry or no-flow conditions, the open-cut wet method would allow Enbridge to quickly and efficiently construct the crossing during excavation and backfilling due to temporary increases in turbidity and sediment transport. The open-cut method would also minimize bed and bank disturbance created by installation of the upstream and downstream dams. Additionally, if a waterbody proposed to be crossed with the open-cut wet crossing method has perceptible flow at the time of crossing, Enbridge would use a dry crossing method. If the flow conditions in a waterbody warrant a different crossing method within 72 hours of initiating the crossing, a request for a crossing method change would be communicated to the appropriate agencies.

For open-cut wet crossings, construction activities involve excavation of the channel and banks in the wetted channel. Construction equipment and excavated soils would be in direct contact with surface water flow. For dry crossing methods (dam-and-pump or flume methods), construction activities also involve excavation of the channel and banks, but the work area would be relatively dry by creating a temporary dam upstream and downstream of the work area. These crossing methods result in relatively less turbidity and sedimentation than wet crossing techniques since most construction activities do not occur in contact with surface waters.

Typically, the dam-and-pump method is suitable for low-flow streams and preferable to the dry flume method for crossing meandering channels; the flume method is suitable for crossing sensitive, relatively narrow streams with straight channels that are relatively free of large rocks and/or bedrock at the crossing point.

Typically, the road-boring technique is used for crossing roads, highways, or railroad crossings. Enbridge has indicated the possibility of using this technique for some of the waterbodies to be crossed by the proposed Project. This technique is proposed for some smaller waterbodies with relatively shallow stream channels and low banks. Enbridge would use road-boring equipment to bore a tunnel under the crossing area. This method involves digging a pit on each side of the area to be crossed. The pit on the entry side of the boring would be approximately 100 by 75 feet, and the pit on the exit side would be 100 by 50 feet. Boring equipment would be placed in the pits on the entry side, and the tunnel would be bored to the exit pit. Tunneling may require several passes of the boring equipment in order to create a hole

with sufficient diameter to accommodate the pipeline. In some cases, a larger diameter "carrier" pipe may be installed first, and the Alberta Clipper pipeline placed within that carrier pipe. When the tunnel is completed, a prefabricated segment of pipe would be pulled through it and welded to the adjoining sections of pipe.

Implementation of measures described in the state-specific EMPs (Appendix C) would reduce adverse impacts resulting from open-cut crossings (both wet and dry methods). All contractors would be required to follow the identified procedures to limit erosion and other land disturbances. The EMPs describe the use of buffer strips, drainage diversion structures, sediment barrier installations, and clearing and grading limits—as well as procedures for waterbody restoration at crossings. As described in the state-specific EMPs (Appendix C), Enbridge's Environmental Inspectors would conduct pre-construction and post-construction site assessments of the waterbodies to document existing conditions that may affect installation of the pipelines and/or restoration of the streambanks.

Following completion of waterbody crossings, streambanks would be restored to pre-construction conditions, unless the existing bank was determined to be unstable. In these cases, additional erosion control measures would be implemented. Once the streambanks have been restored, they would be seeded in accordance with Enbridge's Revegetation and Restoration Monitoring Plans (Appendix K). Banks would be seeded with native vegetation, followed by application of mulch or erosion control fabric (e.g., jute). Additional erosion control measures would be installed, if necessary, in accordance with permit requirements.

Enbridge has identified 22 waterbody crossings where the proposed crossing method is HDD (see Appendix P). Enbridge conducted geotechnical investigations to evaluate the feasibility of using the HDD method at these selected waterbody crossing locations. These investigations were used to determine the possibility of installation problems and whether an alternative method of crossing might be necessary.

In determining whether to use the HDD method at a specific waterbody crossing location, Enbridge evaluated the waterbody for:

- Width of the waterbody crossing;
- Unique features, such as side slopes;
- Sensitive features, such as the presence of coldwater fisheries;
- Protected status and classification of the waterbody; and
- Whether the waterbody is considered impaired.

For each location where the HDD method would be used, Enbridge would prepare a site-specific crossing plan prior to construction.

For waterbody crossings where HDD would be used, no additional instream mitigation would typically be necessary because HDD does not involve direct contact with the surface waterbody, stream channel, or streambanks.

The inadvertent release of drilling fluids (also known as a "frac-out") is a potential impact related to the HDD waterbody crossing method. Drilling muds would be primarily composed of bentonite clay and water with some additives possible. HDD methodology would be conducted in accordance with the state-specific EMPs (Appendix C), which would reduce the possibility of a frac-out. However, if a frac-out

does occur while conducting HDD, appropriate measures would be taken, as described in Enbridge's Drilling Mud Containment, Response, and Notification Plan (Appendix G).

For a stream with low flow, the bentonite clay would likely form a separate layer on top of the existing sediments, like a cake, which has the potential to be physically removed relatively intact. By following the procedures outlined in Enbridge's Drilling Mud Containment, Response, and Notification Plan (Appendix G), it is anticipated that the potential for a release to permanently alter the sediments/streambeds or change the function and quality of the waterbodies is minimal. Impacts, if any, would be localized and anticipated to be short term, and Enbridge would work with the applicable agency or agencies to properly restore the area to prior conditions.

All locations where HDD methods would be conducted could utilize drilling mud additives to increase the likelihood of success of the drill. In addition, various waterbody crossings utilizing road boring construction techniques may require the use of additives based on site conditions at the time of construction. Section 4.7.3.1 summarizes the results of toxicity testing on the proposed drilling mud additives. The drilling mud additives have a very low toxicity to aquatic organisms and are not harmful to the environment. Additives would not be expected to cause any harmful impacts as they are typically approved for use in the installation of water supply wells. For each HDD location, on-site containment and cleanup equipment would be maintained for a timely response in the event of a drilling mud release. In the event that containment and cleanup equipment is deployed, any sediment and/or bentonite deposits collected by the silt curtains would be removed and disposed of at an upland disposal location.

Wild Rice Waters

Wild rice is an annual aquatic grass that is important to the ecology of many lakes and streams. Its nutritious seeds are a valuable waterfowl food. Wild rice can help maintain water quality by binding loose soils, tying up nutrients, and slowing winds across shallow wetlands. These factors can increase water clarity and reduce algae blooms. In addition to providing ecological benefits, wild rice is a central component of Native American culture, particularly with regard to harvesting traditions (Great Lakes Indian Fish and Wildlife Commission 2009). Wild rice production areas were identified along the proposed Project route, including waterbodies in the vicinity of the LLR and FDL Reservation as well as the Pokegama River in Wisconsin.

The LLBO DRM identified four locations of wild rice waters along the route of the proposed Project occurring on the LLR: Pike's Bay Channel; Upper Sucker Lake; Portage Creek; and Mississippi River. The proposed crossing methods for these waterbodies would avoid direct impacts (HDD proposed for Pike's Bay Channel and Mississippi River) or potentially have minor impacts (open-cut methods proposed for Upper Sucker Lake and Portage Creek). For the open-cut crossings, especially Upper Sucker Lake, there could be impacts to wild rice that could result in minor reductions in rice production at these locations that would be limited to the year of construction.

The FDL Natural Resources Program is responsible for management and restoration of wild rice habitat. Seven lakes on reservation lands have been identified that are used for wild rice production or have the potential to grow wild rice: Rice Portage Lake, Bang Lake (also known as Long Lake), Perch Lake, Jaskari Lake, Deadfish Lake, Miller Lake (also known as Mud Lake), and Wild Rice Lake (FDL Natural Resources Program 2008). Because the proposed route across the FDL Reservation is downstream of the seven rice lakes identified by FDL, impacts to wild rice production at these locations would not be expected.

Mitigation and response measures to address potential spills in areas where wild rice is present or proximate are the same as those that would be utilized to address spills in any waterbody or wetland. These measures are described in Enbridge's SPCC Plan (Appendix E)

In Wisconsin, wild rice production area drainages that would potentially be impacted by the Project were identified (WDNR 2008c). Ten of the 14 proposed waterbodies crossed in Wisconsin are considered wild rice production area drainages. Wild rice is known to occur in the shallow wetlands of the Pokegama River near the confluence with the St. Louis River (WDNR 2008d). In order to minimize potential sedimentation concerns, Enbridge would use an open-cut construction method for the Pokegama River only if there is no discernable flow at the time of construction. Otherwise, a dry crossing method would be utilized. The construction right-of-way adjacent to the Pokegama River would be stabilized to minimize erosion and sediment loss. As discussed in the Revegetation and Restoration Monitoring Plans (Appendix K), erosion control blankets would be installed along the banks of the river within 24 hours of construction. Based on the distance to these wild rice areas (approximately 4.5 to 5 miles downstream from the waterbody crossing on the Pokegama River), impacts to wild rice habitat would be minimal.

If other wild rice production areas that could be affected by Project construction are discovered along the Alberta Clipper Project route, Enbridge would work with the landowner or agency managing these resources to determine appropriate measures to be implemented in order to minimize or avoid Project-related impacts to wild rice production areas. Such measures may include installing erosion controls to direct sediment away from waterbodies supporting wild rice, making minor adjustments in the route, or compensating for lost production during construction of the Project. Additionally, Enbridge would review any Native American claim for compensation for agricultural losses, should one be filed, and assess any such claim in light of its determination with respect to the claimant's rights to compensation.

Hydrostatic Testing

Hydrostatic testing is performed to ensure pipeline tightness and integrity prior to filling with petroleum product. Water used for hydrostatic testing would be obtained from nearby surface water resources. However, no water would be taken for hydrostatic testing purposes from any Outstanding Resource Value Waters. The pipeline would be filled to attain a specified internal pressure, which would be maintained for a given length of time, per DOT specifications. After the testing is complete, the water would be returned to the waterbody from which it was taken. Enbridge proposes 15 waterbodies on the Alberta Clipper Project route as potential sources for hydrostatic testing (Table 4.7.3-2).

Where possible, hydrostatic test manifolds would be located away from wetlands and riparian areas. If test manifolds are located within a wetland or riparian area, the anticipated impacts would be short term and are associated with the need to keep the trench line around the manifolds open until the testing is completed and the pipeline segments are welded together. As these manifolds are placed on the ends of the pipe, they are located either within previously excavated mainline trench or within trench that would be excavated for installation of the next portion of the pipeline. Restoration following completion of the test and removal of the manifolds would follow guidelines described in the state-specific EMPs (Appendix C) and Revegetation and Restoration Monitoring Plans (Appendix K).

All waterbodies utilized for hydrostatic testing would be approved by the appropriate federal, state, and tribal agencies prior to initiation of any testing activities. Planned withdrawal rates for each water resource would be approved by these agencies prior to testing. No hydrostatic testing would be initiated without receipt of applicable permits. As stated in Enbridge's state-specific EMPs (Appendix C), water discharged from hydrostatic tests would be sampled as required by state-issued appropriation or discharge permits.

Water withdrawal methods described in Enbridge's EMP (Appendix C) would be implemented and followed. These procedures include screening of intake hoses to minimize the entrainment of fish or debris, keeping the hose at least 1 foot off the bottom of the waterbody, and prohibiting the addition of chemicals or additives into the test water.

Hydrostatic test water would be discharged such that applicable federal, state, tribal, and local environmental standards were met. Discharged water would meet the water quality standards imposed by the discharge permits for the permitted discharge locations. Additionally, hydrostatic test water would not be discharged into any Outstanding Resource Value Waters. No biocides would be injected into the hydrostatic test water during the test; therefore, no biocides would be discharged into the receiving waters.

Flooding

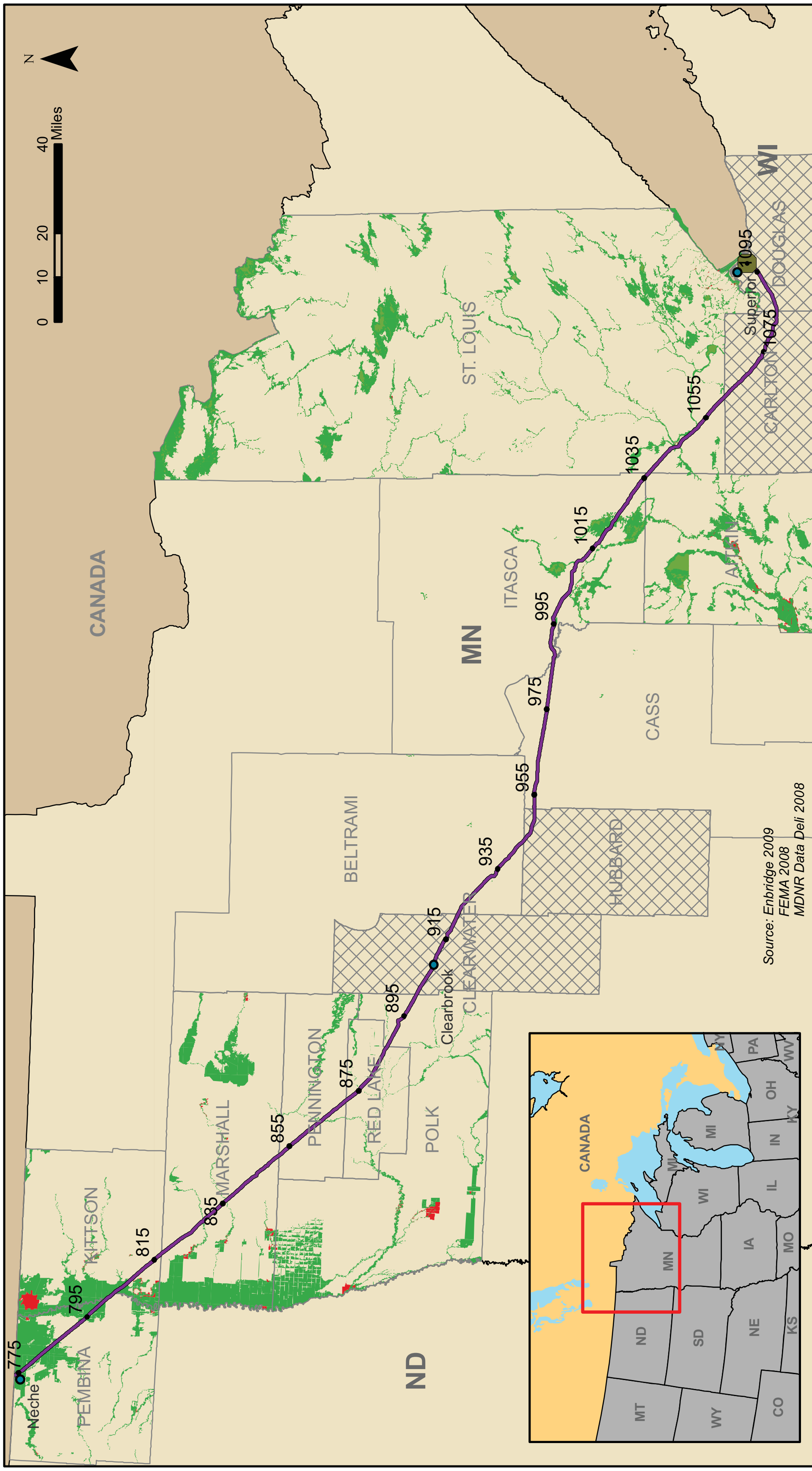
The Federal Emergency Management Agency (FEMA) prepares Flood Insurance Rate Maps (FIRMs) that delineate the flood hazard areas, such as floodplains, for a given community. These maps are used to administer floodplain regulations and to mitigate flood damage. Typically, these maps indicate the locations of the 100-year floodplains, which are the areas with a 1-percent chance of flooding occurring in any single year. Figure 4.3.2-1 depicts the floodplains that would be crossed by the pipeline. Currently, no flood zone information is available for Clearwater, Hubbard, or Carlton Counties in Minnesota; or for Douglas County in Wisconsin. The proposed pipeline route intersects the 100-year floodplain in numerous locations between MP 775 and MP 905 and between MP 995 and MP 1055.

During construction, open trenches may pose a risk of flooding. According to the state-specific EMPs (Appendix C), Enbridge would limit the amount of open trench to approximately 14,000 feet per pipeline, per spread, which is approximately equivalent to 2 days of expected mainline welding production. By limiting open trench and associated temporary soil stockpiles, this approach would reduce the potential for erosion and sediment runoff resulting from unforeseen weather events. Additionally, Enbridge would restore pre-construction contours within 24 to 48 hours of construction activities within waterbodies 100 feet wide or less. If flooding occurred during the brief period that the trench was open, Enbridge would dewater the trench, as necessary, in an effort to minimize damage to the surrounding land use (e.g., agriculture). In its AMP (Appendix F), Enbridge states that compensation would be paid to landowners for related losses.

Blasting

As described above in regard to groundwater, Enbridge has stated that blasting is not expected to be part of their construction activities. Less than 1 percent of the proposed pipeline route crosses areas of shallow bedrock (within 5 feet of the ground surface), and this is in St. Louis County, Minnesota.

Enbridge's Blasting Plan (Appendix L) includes requirements for transporting, storing, handling loading, detonating, and disposing of blasting materials. The plan also identifies requirements for developing a site-specific blasting plan for any area where blasting is deemed necessary. This site-specific plan would account for protection of aboveground and belowground structures such as water mains, threatened and endangered species, and water resources (surface water and groundwater).



Legend

- Alberta Clipper Pipeline
- Project Milepost
- Superior Terminal Expansion Project
- 100-Year Flood Zone
- 500-Year Flood Zone
- No Data

ALBERTA CLIPPER PROJECT

FIGURE 4.3.2-1
FLOOD ZONES

Spill and Leak Prevention Measures

Implementation of the procedures in Enbridge's SPCC Plan (Appendix E) would minimize the potential for spills and leaks to affect surface water resources during construction. As stated in this plan, storage of petroleum products, as well as refueling and lubrication activities, would be conducted in upland areas at least 100 feet away from all surface waterbodies (including drainage ditches) during construction activities whenever possible. If refueling must be conducted within 100 feet of a surface waterbody, precautions would be taken as described in the SPCC Plan. As discussed in the state-specific EMPs (Appendix C), equipment would not be washed, lubricated, or parked overnight within 100 feet of streams or waterbodies.

Operations Impacts

During standard operations, minor temporary to short-term surface water quality degradation is possible from maintenance equipment and vehicle spills or leaks. Although not anticipated, channel migration or scour could reduce the burial depth or even expose the pipeline. Any evidence of these events could result in implementation of protective activities, such as reburial or bank armoring. These activities could result in temporary or short-term adverse impacts to water resources associated with turbidity and sedimentation.

Although spills are not considered a part of routine operations, there is the possibility of a petroleum release occurring with the associated potential to affect surface waterbodies. Pipeline control valves would be installed on both sides of larger perennial streams. In the event of a crude oil release, the presence of valves and enactment of Enbridge's ERP and spill containment measures would reduce the potential for any crude oil releases to affect surface water resources.

The ERP describes actions to reduce the potential for crude oil releases to affect surface water and groundwater resources. Potential impacts on water resources from accidental crude oil spills are described in Section 4.13.5.3.

Over the operational life of the Alberta Clipper Project, there would be a very low likelihood of a crude oil release from the pipelines due to implementation of the pipeline construction and maintenance standards and the leak detection methods. For additional information on reliability and safety considerations for the proposed pipeline, see Section 4.13.

4.3.3 Connected Actions

The Superior Terminal Expansion Project in Superior, Wisconsin is considered a connected action to the proposed Project. Enbridge has proposed to install five new storage tanks at the Superior Terminal, each with a nominal capacity of 250,000 barrels. In addition to the storage tanks, a new facility line approximately 4,600-feet long would be constructed at the Superior Terminal to connect the Alberta Clipper pipeline to the new storage tank area.

The new tanks and all associated equipment and facilities would be installed inside the existing boundaries of the terminal, as depicted in Figure 2.9.2-1. No waterbodies would be crossed during construction of the connected action, although some wetlands habitat would be permanently filled (see Section 4.4.4). Existing erosion control techniques at the terminal would be used by Enbridge to control surface water runoff. Therefore, any impacts to surface water or groundwater resources associated with construction and operation of the connected action would be expected to be negligible. Additional information on the potential impacts of the proposed Project and the Superior Terminal Expansion is provided in Section 4.14.18.2.

4.3.4 References

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4.4 WETLANDS

The Alberta Clipper Project would cross three states (North Dakota, Minnesota, and Wisconsin) and two Indian reservations (the LLR and FDL Reservations in Minnesota) where a variety of wetland types would be encountered; the majority of these are considered emergent or scrub-shrub wetland communities. In addition to the diversity of wetland types crossed, specially designated wetland areas are described in this section. Four categories of wetlands are considered to meet this criterion: wetlands listed in the MDNR Protected Waters Inventory as Public Water Wetlands, Outstanding Resource Value Waters, lands affiliated with the NRCS WRP, and Wisconsin State Natural Areas (SNAs)/Areas of Special Natural Resource Interest (ASNRI). This section addresses wetland impacts and mitigation efforts for all wetland areas that would be crossed by the proposed Project, including those that are specially designated.

4.4.1 Environmental Setting

Wetlands crossed by the proposed pipeline were classified according to the Eggers and Reed system as described in Table 4.4.1-1 (Eggers and Reed 1997). This system classifies plant communities based on water permanence and depth, as well as the degree of saturation. These factors control the nature of the dominant plant groups that characterize the wetland type (Eggers and Reed 1997). Based on the Eggers and Reed system, the predominant wetland types that would be crossed by the proposed Project are forested and scrub-shrub communities. Emergent wetland communities crossed by the proposed Project include deep and shallow marshes, sedge meadows, fresh (wet) meadows, wet to wet-mesic prairies, and seasonally flooded basins. Scrub-shrub wetland communities crossed by the proposed Project include shrub-carr and alder thicket. Forested wetland communities that would be crossed include hardwood swamps, coniferous bogs, and coniferous swamps. Wetlands occurring in the proposed Project area also are classified under the Cowardin classification system (Cowardin et al. 1979); these classifications are provided in Appendix P. MDNR public water wetlands were classified according to FWS Circular No. 39 (MBWSR 2008).

In general, wetlands are of great functional and social significance, providing surface water storage (flood control), shoreline stabilization (wave damage protection/shoreline erosion control), streamflow maintenance (maintaining aquatic habitat and aesthetic appreciation opportunities), groundwater recharge (some types replenish water supplies), sediment removal and nutrient cycling (water quality protection), aquatic productivity (fishing, shellfishing, and waterfowl hunting), production of trees (timber harvest), production of herbaceous growth (livestock grazing and haying), production of peaty soils (peat harvest), and plant and wildlife habitat (hunting, trapping, plant/wildlife/nature photography, nature observation, and aesthetics) (FWS 2008).

Wetland communities associated with the proposed Alberta Clipper Project were identified based on photo interpretation of 1:6,000-scale aerial photography dated May 2007. Wetlands also were verified and delineated in accordance with the routine determination method under the guidance of the COE staff in the St. Paul District, during field surveys conducted between fall 2006 and spring 2008; however, the COE will independently verify the results of the field delineations prior to the issuance of any COE permit. Descriptions of the wetland communities that occur within the Alberta Clipper Project right-of-way are provided in Table 4.4.1-1.

TABLE 4.4.1-1 Description of Wetland Communities in the Alberta Clipper Project Area		
Eggers and Reed Classification	**Code**	**Description**
Coniferous swamp	CS	Forested wetlands dominated by lowland conifers, primarily northern white cedar and tamarack, growing on soils that are saturated during much of the growing season and that may be temporarily inundated by as much as a foot of standing water. Balsam fir may be a component in some stands. Soils are usually organic (peat/muck) and can vary from nutrient-poor and acidic, to fertile and alkaline or neutral. Tamarack typically dominates on the former soils, and northern white cedar on the latter.
Hardwood swamp	HS	This plant community consists of wetlands dominated by deciduous hardwood trees and soils that are saturated or inundated by as much as a foot of water. The tree layer may consist of black ash, red maple, yellow birch, silver maple, northern red cedar, or American elm. The shrub layer likely consists of shrub-size individuals of the dominant tree species along with dogwoods and alder. The ground layer may also include ferns, sedges, grasses and forbs. These wetlands are commonly found in ancient lake basins. This wetland classification frequently includes vernal pools.
Coniferous bog	CB	Mature black spruce, tamarack, or northern white cedar trees (diameter at breast height [dbh] greater than 6 inches) over a carpet of living sphagnum moss are characteristic of this wetland type. The heath (Ericaceae) family is typically well represented; and sedges, orchids, and pitcher plants are often present in shaded areas. Most bogs are found in northeastern Minnesota and northern Wisconsin. Black spruce and heath family shrubs are characteristic of wetlands with acid peat soils. Tamarack and northern white cedar are typically present where there are calcareous peat soils.
Alder thicket	AT	Like shrub-carr wetlands, this is a shrub-swamp-wetland plant community dominated by tall, deciduous shrubs growing on saturated to seasonally flooded soils—although this wetland type is dominated by speckled alder. These plant communities are found in northeastern Minnesota and northern Wisconsin. Speckled alder may occur as a monotype, or it could have a diversity of other shrubs such as high-bush cranberry, sweet gale, and common winterberry holly. The ground layer may be composed of ferns, sedges, grasses, and forbs, depending on the openness of the shrub canopy, degree of disturbance, and water source.

TABLE 4.4.1-1 (continued)
Description of Wetland Communities in the Alberta Clipper Project Area

Eggers and Reed Classification	Code	Description
Shrub carr	SC	This is a shrub-swamp-wetland plant community dominated by tall, deciduous shrubs growing on saturated to seasonally flooded soils. Woody vegetation is typically less than 20 feet in height with a dbh of less than 6 inches. Willows, red-osier dogwood, or silky dogwood generally dominate the shrub layer with a ground layer of ferns, sedges, grasses, and forbs. The diversity of the ground layer is dependent on the openness of the shrub canopy, degree of disturbance, and water source.
Sedge meadow	SEM	Saturated soils dominated by sedge communities distinguish this wetland type. Sedge species typically dominate sedge meadows; but spike-rushes, bulrushes, and nut-grasses may also be present. Grasses and forb species likely are present, adding diversity to the vegetative community—although forbs may flower poorly due to intense competition with the sedges. Soils usually consist of peat or muck.
Shallow marsh	SM	Water depths are typically less than 6 inches and may consist of only enough to saturate the soil throughout the growing season. Herbaceous emergent vegetation characterize this wetland type, such as cattails, bulrushes, arrowheads, and lake sedges. Emergent aquatic plants typically become established and spread when water levels are low or soil becomes exposed, and they persist when water levels rise.
Deep marsh	DM	Standing water depths are typically between 6 inches and 3 or more feet during the growing season, and fluctuate in depth throughout the year. This wetland type is characterized by herbaceous emergent, floating, floating-leaved, and submergent vegetation including cattail, hardstem bulrush, pickerelweed, giant bur-reed, Phragmites, wild rice, pondweeds, and water-lilies. Emergent aquatic plants typically become established and spread when water levels are low, and they persist when water levels rise.
Wet to wet-mesic prairie	WMP	True grasses make up at least half of the vegetative cover in these open, herbaceous plant communities. This wetland type is similar to fresh (wet) meadows; but the native grasses, grass-like species, and forbs are associated with prairies—such as prairie cordgrass, big bluestem, gayfeather, New England aster, culver's root, prairie dosk, and sawtooth sunflower. This vegetation community occurs only in western and southern Minnesota and southern Wisconsin.
Fresh meadow	FM	Saturated soils dominated by grasses and forbs differentiate this wetland type. Grasses may consist of redtop grass, reed canary grass, and Kentucky bluegrass. Forbs likely consist of the aster (Compositae) family. Fresh (wet) meadows often consist of less competitive, short-lived species, but may persist for extended periods once established.

TABLE 4.4.1-1 (continued) Description of Wetland Communities in the Alberta Clipper Project Area		
Eggers and Reed Classification	**Code**	**Description**
Shallow open water	SOW	Water depths are less than 6.6 feet and very rarely fluctuate; therefore, emergent aquatic vegetation cannot become established. This wetland type is characterized by submergent, floating and floating-leaved aquatic plants, including pondweeds, water-lilies, water milfoil, coontail, and duckweed. Size varies from a 0.25-acre pond to a long oxbow of a river or shallow bay of a lake.
Seasonally flooded basin	SFB	This wetland type includes poorly drained, shallow depressions that typically have standing water for a few weeks but are dry for the remainder of the year. This type includes kettles on glacial deposits, low spots on outwash plains, and depressions in floodplains. Typical species include smartweed, beggarticks, nutgrasses, and wild millet. Perennial plants generally cannot become established due to the periods of flooding and drought, so annual species usually dominate this community.

Source: Eggers and Reed 1997.

As part of federal regulatory requirements under the CWA, inventories of wetlands and other waters of the United States involving field delineations are required to evaluate the potential for adverse effects to waters of the United States along the proposed pipeline right-of-way and other associated areas of disturbance related to Project construction. Information gathered during the inventories are being used to complete notification and permitting requirements under Sections 404 and 401 of the CWA, as managed, in general, by the COE and applicable federal and state agencies, respectively. Within the FDL Reservation, however, the FDL has federally delegated regulatory authority for the CWA on the FDL Reservation (FDL 2008).

The proposed Project falls under the jurisdiction of the COE St. Paul District (for Minnesota and Wisconsin) and Omaha District (for North Dakota). Enbridge filed applications for Section 404 permits with the COE St. Paul District in November 2008 and with the COE Omaha District in January 2009. Enbridge will continue consultations with the COE and federal/state resource agencies to develop the specific wetland information required for permit acquisition. With regard to CWA Section 401 certification, MPCA has responsibility on non-reservation lands in Minnesota, EPA for lands within the LLR, FDL for lands within the FDL Reservation, and WDNR for lands in Wisconsin.

4.4.2 Specially Designated Wetlands

Within the proposed Project area, various wetlands have been specially designated for specific reasons, including size (MDNR Public Waters Wetlands), high-value resources (Outstanding Resource Value Waters), involvement in a federal funding program (NRCS WRP), and overall habitat quality and species occurrence (State Natural Areas and Areas of Special Natural Resource Interest). Although specially designated, these wetlands have the same functions as those without special designations, as described above. Although not afforded special designations, additional types of wetlands occur that are of special concern, both in general and to specific agencies. For example, coniferous bogs and hardwood swamps are of special concern to MPCA. As such, MPCA may require additional mitigation to minimize impacts to these wetland types.

4.4.2.1 MDNR Public Water Wetlands

Based on the Enbridge review of the Minnesota Protected Waters Inventory, the proposed Project would cross five wetlands listed as public water wetlands. "Public water wetlands" include all Types 3, 4, and 5 wetlands (as defined in FWS Circular No. 39, 1971 edition) that are 10 acres or larger in unincorporated areas or 2.5 acres or larger in incorporated areas. MDNR defines wetland types according to FWS Circular No. 39 (1971 edition); the wetlands that would be crossed by the proposed Project are classified as Types 1 through 8 under that classification system; and wetlands considered to be public water wetlands fall under the categories of Types 2, 3, 4, 5, 6, and 8 (see Table 4.4.2-1) (MBWSR 2008). The Circular 39 classification Types 1 through 8 are comparable to the Eggers and Reed classification of seasonally flooded basin, fresh/sedge meadow, shallow marsh, deep marsh, shallow open water, alder thicket/shrub carr, hardwood/coniferous swamp, and open/coniferous bog wetland communities, respectively.

4.4.2.2 Outstanding Resource Value Waters

Calcareous fen wetlands are designated as Outstanding Resource Value Waters by MDNR and are given special protection through Minnesota Rules and statutes, which state that these resources may not be filled, drained, or otherwise degraded, wholly or partially, by any activity except as provided for in a management plan approved by MDNR. Calcareous fens result from the upwelling of groundwater through calcareous substrates such as limestone or dolomite. Impacts to groundwater hydrology in the vicinity of the fen have the potential to degrade these habitats. Consultation with MDNR has indicated that two calcareous fens occur near the proposed right-of-way: the Viking fen, which is approximately 350 feet north of the pipeline route at MP 844.8, and the Norden fen, which is approximately 200 feet west of the pipeline route at MP 853.6. In addition, Enbridge has identified an area with fen-like characteristics near MP 893, although the area has not been officially designated by MDNR. Numerous sensitive plants occur within or adjacent to these three areas.

4.4.2.3 NRCS Wetland Reserve Program

Enbridge has identified two wetlands in the NRCS WRP that would be crossed by the proposed Alberta Clipper Project (MP 792.1 and MP 792.3), both of which are in North Dakota. The NRCS, in consultation with the FSA, administers the WRP; this voluntary program offers landowners the opportunity to protect, restore, and enhance wetlands located on their property (NRCS 2008a). The private owner retains title to the lands in the WRP, but the NRCS controls a protective easement over the properties. Both WRP easements along the Project route were established after installation of the Enbridge pipeline right-of-way on these parcels. The program attempts to restore wetland function and wildlife habitat, and to promote long-term conservation through technical and financial assistance. "Prior converted wetlands" (cropland and farmed wet pasture) are wetlands converted to agriculture that are targeted for voluntary restoration (NRCS 2008b).

TABLE 4.4.2-1 Circular 39 Classifications of Wetland Communities in the Alberta Clipper Project Area	
Circular 39 Wetland Classification	**Wetland Characteristics**
Type 1 – seasonally flooded basin	The variable vegetation in seasonally flooded basins changes with the season and includes seasonal waterfowl and wildlife habitat.
Type 2 – wet meadow	The soil of wet meadows is typically without standing water during the majority of the growing season; however, saturation occurs below the surface. Vegetation includes grasses, sedges, rushes, and various broad-leaved plants. Wet meadows support both waterfowl and wildlife habitat and provide water quality benefits, such as groundwater recharge and discharge.
Type 3 – shallow marsh	The soil of shallow marshes is typically waterlogged in spring and covered with 6 or more inches of water. Common vegetation includes grasses, bulrushes, cattails, spikerushes, and arrowheads. These wetlands protect water quality, provide habitat for a variety of species, and serve recreational purposes.
Type 4 – deep marsh	The soil in deep marshes is usually covered with water from approximately 6 inches to 3 feet during the spring and summer months. Vegetation includes cattails, bulrushes, reeds, spikerushes, and wild rice. In the open water environment of these wetlands, aquatic vegetation such as pondweed, duckweed, and water-lilies can be found. Deep marshes tend to fill basins and depressions, and offer water quality protection and floodwater detention. Wildlife and fisheries habitat also is supported in this deep water environment.
Type 5 – open water wetland	Open water wetlands contain water less than 6 feet deep and are fringed by a border of emergent vegetation. These wetlands provide floodwater detention, wildlife and fish habitat, and recreation.
Type 6 – shrub swamp	Shrub swamps possess waterlogged soils throughout the growing season and are typically inundated with as much as 6 inches of water. Common vegetation includes alders, willows, and buttonbush. Benefits associated with these areas include water quality, such as floodwater retention and low flow augmentation. In addition, these areas are known to support wildlife habitat.
Type 7 – wooded swamp	Wooded swamps have soils that are waterlogged to within a few inches of the surface during the growing season and can be inundated with approximately 12 inches of water. Trees found in these wetland areas include tamarack, white cedar, black spruce, red maple, and black ash. Benefits of these wetlands are similar to those associated with shrub swamps. In addition, wooded swamps provide timber harvesting.
Type 8 – bog	Bogs possess waterlogged soils with mosses covering the surface. Vegetation includes heath shrubs, sphagnum moss, sedge, cranberries, black spruce, and tamarack. Benefits of bogs include peat harvesting, water quality, and shoreland protection.

Source: MBWSR 2008.

4.4.2.4 State Natural Area/Area of Special Natural Resource Interest

SNAs protect outstanding examples of native natural communities, significant geological formations, and archaeological sites that have remained relatively unaltered by human disturbance or have significantly recovered from such disturbance. SNAs also provide refuge for rare plants and animals. In Wisconsin, the only state in which the proposed Project would cross an SNA, more than 90 percent of the plants and 75 percent of the animals on the state list of endangered and threatened species are protected on habitat within an SNA. Once WDNR has determined that an area fits the requirements of an SNA, the land is acquired through purchase, donation, conservation easements, or cooperative agreements with other

agencies (if the area in question is under another agency's purview). Once the land has been obtained and official designation as an SNA has been provided, the area is protected by Wisconsin Statutes Chapters 23.27 through 23.29, Wisconsin Administrative Code Chapter Natural Resource (NR) 45, and various additional guidelines (WDNR 2009).

The Pokegama Carnegie Wetland Complex is a Wisconsin-designated SNA and ASNRI that is owned by Douglas County and WDNR. The Superior Airport/Hill Avenue Wetlands/South Superior Triangle Wetland Complex is also a Wisconsin-designated ASNRI. The wetland complexes lie between the Pokegama and Little Pokegama Rivers and feature extensive mosaics of wetlands that contain many rare plant species. Many of the rare plants are represented by large or multiple populations throughout the complex, and some are not generally widespread within the Lake Superior region (WDNR 2007).

4.4.3 Potential Impacts and Mitigation

Potential impacts from the proposed Project include construction-related impacts as well as impacts due to operation and maintenance of the pipeline right-of-way. The Alberta Clipper Project could primarily affect wetland resources by:

- Modification in wetland vegetation community composition, structure, and productivity due to modification of surface and subsurface flow patterns;
- Loss or alteration of surface and subsurface hydrology that is important for maintaining wetland communities and microhabitats;
- Temporary and permanent modification of wetland vegetation community composition and structure as a result of clearing and operational maintenance;
- Alteration in wetlands due to backfilling or draining;
- Wetland soil disturbance (mixing of topsoil and subsoil with altered biological activities and chemical conditions that could affect reestablishment and natural recruitment of native vegetation after restoration);
- Sedimentation and fluctuations in wetland hydrology (due to trenching, dewatering, and stockpiling activities);
- Impact to water-retaining substrates, thereby causing permanent alterations to their water-holding capacity;
- Reduction in wildlife habitat and forage productivity, and increased risk of soil erosion and weed invasion due to removal of vegetation from the right-of-way during construction;
- Loss of sensitive plant individuals and habitat as a result of construction clearing and grading;
- Potential spread of invasive species and noxious weed populations along the pipeline right-of-way during construction; and
- Loss of individuals and habitats due to exposure to toxic materials from equipment spills or refueling operations, or accidental crude oil releases (addressed in Section 4.13).

4.4.3.1 General Wetlands Resources

Wetland communities that would be affected by the proposed pipeline are summarized in Table 4.4.3-1. Although wetlands are known to be within the boundaries of two of the 10 surveyed pipe storage/contractor yards (approximately 5.2 acres of non-forested wetlands), those wetlands would be roped off and not be used to avoid potential impacts. Another eight storage/contractor yards have not yet

been surveyed for the presence of wetlands; however, any wetlands encountered also would be roped off in order to avoid impacts. In addition, Enbridge is surveying existing access roads to determine whether additional modifications would be needed for their use. Further consultation with the COE would be necessary should those modifications result in impacts to wetlands; however, Enbridge has stated that they would not use access roads associated with wetlands unless modifications could be limited to the temporary use of timber mats. In adhering to its proposed voluntary mitigation, Enbridge would limit wetland impacts to those wetlands within the right-of-way and workspaces.

TABLE 4.4.3-1
Wetlands Estimated Impact Summary for the Alberta Clipper Pipeline

Wetland Classification[a]	Length of Wetlands Crossed (miles)	Wetland Area Affected during Construction (acres)[b]	Wetland Area Affected by Operations (acres)[c]	Number of Crossings
North Dakota				
Sedge Meadow	0.01	0.12	0.02	1
Seasonally Flooded Basin	0.20	2.90	0.61	1
Shallow Marsh	1.82	26.07	5.53	10
Hardwood Swamp	0.02	0.00	0.00	12
North Dakota subtotal	*2.05*	*29.09*	*6.16*	*24*
Minnesota				
Alder thicket	7.13	119.68	80.73	36
Coniferous bog	12.06	199.99	137.04	23
Coniferous swamp	1.41	21.36	13.99	3
Deep marsh	0.74	7.90	3.79	7
Fresh meadow	3.83	56.40	29.91	70
Hardwood swamp	18.58	278.43	164.82	72
Shrub carr	3.54	54.91	22.50	67
Sedge meadow	0.74	8.22	1.51	7
Seasonally flooded basin	0.56	6.76	1.74	41
Shallow marsh	4.30	66.26	27.10	83
Shallow open water	0.05	1.00	0.17	4
Wet to wet-mesic prairie	0.73	11.32	7.23	18
Minnesota subtotal (less tribal lands)	*53.68*	*832.23*	*490.53*	*431*
Leech Lake Reservation				
Alder thicket	1.85	29.95	19.45	7
Coniferous bog	7.20	119.26	88.04	11
Coniferous swamp	0.13	2.47	1.22	2
Deep marsh	0.74	2.13	1.56	3
Fresh meadow	0.61	10.00	7.28	6
Hardwood swamp	2.48	40.34	22.80	11
Shrub carr	2.05	35.15	23.77	13

TABLE 4.4.3-1 (continued) Wetlands Estimated Impact Summary for the Alberta Clipper Pipeline				
Wetland Classification [a]	**Length of Wetlands Crossed (miles)**	**Wetland Area Affected during Construction (acres) [b]**	**Wetland Area Affected by Operations (acres) [c]**	**Number of Crossings**
Leech Lake Reservation (continued)				
Seasonally flooded basin	0.06	0.49	0.45	6
Shallow marsh	0.50	5.44	3.88	7
Shallow open water	0.18	0.00	0.00	1
Wet to wet-mesic prairie	0.60	9.28	6.41	19
Leech Lake Reservation subtotal	*16.40*	*254.53*	*174.86*	*86*
Fond du Lac Reservation				
Alder thicket	1.02	16.28	11.71	5
Coniferous bog	1.57	25.65	18.37	5
Coniferous swamp	1.71	28.03	20.16	4
Fresh meadow	0.42	7.20	4.70	5
Hardwood swamp	1.88	30.78	22.60	6
Shallow marsh	1.13	19.00	13.65	4
Fond du Lac subtotal	*7.72*	*126.95*	*91.19*	*29*
Minnesota subtotal	*77.80*	*1,213.70*	*756.57*	*546*
Wisconsin				
Alder thicket	4.93	70.12	42.13	30
Fresh meadow	0.13	1.43	0.81	7
Hardwood swamp	0.79	18.64	6.41	11
Shrub carr	0.34	6.00	2.75	8
Sedge meadow	0.43	4.33	3.96	8
Seasonally flooded basin	0.04	0.40	0.36	3
Shallow marsh	0.10	1.56	0.97	7
Shallow open water	0.02	0.37	0.21	1
Wet to wet-mesic prairie	0.03	0.51	0.31	3
Wisconsin subtotal	*6.81*	*103.37*	*57.91*	*78*
Alberta Clipper Project Subtotals				
Alder thicket	14.93	236.03	154.02	78
Coniferous bog	20.82	344.91	243.45	39
Coniferous swamp	3.26	51.86	35.37	9
Deep marsh	1.48	10.03	5.35	10
Fresh meadow	4.99	75.03	42.70	88
Hardwood swamp	23.75	368.20	216.63	112

TABLE 4.4.3-1 (continued) Wetlands Estimated Impact Summary for the Alberta Clipper Pipeline				
Wetland Classification [a]	**Length of Wetlands Crossed (miles)**	**Wetland Area Affected during Construction (acres) [b]**	**Wetland Area Affected by Operations (acres) [c]**	**Number of Crossings**
Shrub carr	5.93	96.06	49.02	88
Sedge meadow	1.18	12.66	5.49	16
Seasonally flooded basin	0.86	10.54	3.17	51
Shallow marsh	7.85	118.33	51.13	111
Shallow open water	0.25	1.38	0.37	6
Wet to wet-mesic prairie	1.36	21.12	13.95	40
Alberta Clipper Project total	*86.66*	*1,346.16*	*820.64*	*648*

[a] Eggers and Reed classifications: shallow open water is open water wetlands; deep marsh, fresh meadow, sedge meadow, open bog, seasonally flooded basins, shallow marsh, and wet-wet mesic prairie are emergent wetlands; alder thicket and shrub carr are scrub-shrub wetlands; and coniferous bog, hardwood swamp, and coniferous swamp are forested wetlands.

[b] Construction (temporary) impacts include a 125-foot-wide right-of-way. Wetlands associated with HDD crossings would incur no impact and are therefore not included in the acreage impacts.

[c] Operations (permanent) impacts include a 25-foot-wide right-of-way north of Clearbrook, Minnesota and a 75-foot-wide right-of-way south of Clearbrook that would be permanently maintained in an herbaceous state. Operations impacts are provided as a subset of the construction impacts and do not represent additional impact.

[d] Although the Leech Lake and Fond du Lac Reservations are located within Minnesota, each reservation is a separate sovereign entity; therefore, acreage impacts incurred to wetlands within the reservations are not included in those represented for the State of Minnesota.

Approximately 86.7 linear miles of wetland resources would be crossed by the proposed Project. Coniferous bog wetlands are the most common type of wetland community that would be crossed, followed by alder thicket and shallow marsh (Table 4.4.3-1). The vast majority of all wetlands crossed by the route (approximately 90 percent) occur in Minnesota, followed by Wisconsin (8 percent) and North Dakota (2 percent). No forested wetlands would be impacted within the pipeline right-of-way in North Dakota. Wetlands crossed within the LLR would account for 19 percent of all wetlands crossed by the proposed Project and 21 percent of the wetlands crossed in Minnesota. Similarly, the 9 percent of wetlands crossed by the proposed Project that would be within the FDL Reservation represent 11 percent of the wetlands crossed in Minnesota.

Construction of the pipeline primarily would affect wetlands and their functions during and immediately following construction activities, but permanent changes are possible. Wetlands function as natural sponges that trap and slowly release surface water, rain, snow melt, groundwater, and flood waters. Trees, root mats, and other wetland vegetation slow flood waters and distribute them over the floodplain. Wetlands at the margins of lakes, rivers, and streams protect shorelines and streambanks against erosion. Wetland plants hold the soil in place with their roots, absorb the energy of waves, and break up the flow of stream or river currents. This combined water storage and braking can lower flood heights and reduce erosion. The water-holding capacity of wetlands reduces flooding and prevents waterlogging of crops. Preserving and restoring wetlands, together with other water retention, can help or supplant flood control otherwise provided by expensive dredge operations and levees (EPA 2008).

The emergent wetland vegetation would regenerate relatively quickly into a community functionally similar to that of the wetland prior to construction, if pre-construction conditions such as contours and hydrology are achieved. In emergent wetlands, no long-term impacts are anticipated (248 acres). The herbaceous vegetation would be expected to typically regenerate within 3 years. Emergent wetland

vegetation in the pipeline right-of-way generally would not be mowed or otherwise maintained. Typical right-of-way maintenance equipment involves a rubber-tracked skid-steer vehicle with specialized cutting equipment. The specific width that would be maintained depends on the easement for the individual parcel.

Wooded (scrub-shrub and forested) wetlands would be cleared within the entire construction right-of-way during construction. Clearing of these species is considered the most substantial impact to vegetation associated with the proposed Project. After construction, wooded wetlands would be allowed to regenerate in the cleared areas that would not be retained as the permanent right-of-way. Scrub-shrub wetland communities would require a more extensive period (likely 5 to 10 years) to reestablish when compared to emergent communities. Tree species that typically dominate forested wetlands in the Alberta Clipper Project area (willow, ash, tamarack, and spruce) require regeneration periods of 50 years or more. Because trees and shrubs would not be allowed to fully regenerate within the maintained right-of-way, removal of wooded wetland habitats due to pipeline construction would represent a permanent conversion of forested and scrub-shrub to emergent or early stage scrub-shrub wetlands. The total acreage of affected forested wetland during construction is approximately 765 acres, and the total acreage of scrub-shrub wetland affected during construction would be approximately 332 acres. The maintained right-of-way would result in permanent conversion of approximately 495 acres of forested wetland and 203 acres of scrub shrub wetland to emergent or early stage scrub-shrub wetlands due to periodic right-of-way clearing for the life of the proposed Project. Impacts to the carbon cycle from wetland clearing are discussed in Section 4.14.3.12.

It should be noted that, for COE purposes, all cleared forested wetlands would be considered a permanent conversion to non-forested wetlands due to an applicant's inability to ensure that temporary work areas would be allowed to return to a forested status. As such, the COE would require mitigation for the permanent conversion of the entire 765 acres of forested wetland cleared during construction of the proposed Project.

HDD crossings for selected waterbodies and associated wetlands would generally avoid impacts to these resources; however, the use of HDD does carry a risk of the escape of drilling fluids (frac-out) into and around the resources that an HDD is meant to protect. The drilling fluid would be a predominantly non-toxic material (bentonite) but would include additives that could potentially be toxic to aquatic organisms in high concentrations (see Sections 4.3.2.2 and 4.7.3.1). In the event of a release of drilling mud, the concentrations of the additives would be minimal and therefore would result in minimal impact to wetland habitats. A large subsurface frac-out that does not reach the surface may fill subsurface voids and potentially cause the upward displacement of water and materials, creating a "doming" effect until the water in the dome reaches equilibrium with the surrounding hydrology. Enbridge has prepared a Drilling Mud Containment, Response, and Notification Plan that identifies procedures to address the inadvertent release of drilling mud during HDD operations (Appendix G). Impacts to wetlands from potential spills and accidents during operations are discussed in Section 4.13.5.4.

As identified in Appendix U, a total of 14.4 miles (about 226 acres) of wetlands located in the CNF would be crossed by the proposed Project (all of which would also be within the LLR). The wetlands in this area would be comprised mainly of emergent, scrub-shrub, or unconsolidated bottom wetlands (177.9 acres). Approximately 47.9 acres of this wetland habitat would be forested. In general, wetlands crossed within the CNF would experience impacts identical to those wetlands crossed outside of the CNF; however, an analysis of impacts specific to the CNF is presented in Appendix U. Similarly, impacts to wetlands crossed within the LLR and FDL Reservation would be comparable to those outside of the reservations. The wetlands crossed in the LLR would be comprised mainly of forested wetlands (162.1 acres) and the remaining 92.5 acres would be emergent or scrub-shrub. Within the FDL

Reservation, 127.0 acres would be crossed, of which approximately 84.5 acres would be forested (Table 4.4.3-1).

The proposed Project's aboveground facilities would require modification of existing pump stations to accommodate the new pipeline. New aboveground facilities include additional pumping infrastructure at three existing pump locations, new piping, one launcher, two receivers, booster pumps, storage tanks, and mainline valves. No aboveground facilities associated with the Alberta Clipper pipeline would be placed in wetlands.

During operations, Enbridge would aerially inspect the right-of-way on a bi-weekly basis to detect abnormal conditions or evidence of third-party damage. Right-of-way maintenance in both upland and wetland areas would include removal of woody vegetation by mechanical means, such as use of a rubber-tracked skid-steer vehicle with specialized cutting equipment, to allow for the aerial inspections. Maintenance would include removal of vegetation that has grown to a diameter of 2 to 3 inches and a height of 10 to 15 feet, and clearing would generally occur every 5 to 10 years during fall or winter. Herbaceous growth generally would not be removed. The width of the right-of-way that would be maintained would be in accordance with the individual easement for a particular parcel.

Based on information from prior pipeline activity occurring in the vicinity of the proposed Alberta Clipper Project area, operation of the proposed Project would be expected to cause slight increases in soil temperatures at the soil surface immediately above the pipeline (1 to 2 ˚F), primarily during winter months; and at depths of 6 inches (1 to 5 ˚F), with most notable increases during spring. In general, increased soil temperatures during early spring could cause early germination and emergence and increased productivity in wetland plant species. Increased soil temperatures also may stimulate root development (TransCanada 2007).

Operation of the Alberta Clipper Project also would be expected to cause slight increases in water temperatures where the pipeline crosses through wetlands. Effects would be most pronounced in small ponds and wetlands, as any excess heat would be quickly dissipated in large waterbodies and flowing waters. Small ponded wetlands may remain unfrozen a few days later than surrounding wetlands and may thaw a few days sooner than surrounding wetlands. Early and late migrant waterfowl may tend to be attracted and concentrated in these areas during spring and fall migrations (TransCanada 2007).

To minimize potential construction- and operations-related effects, Enbridge would implement procedures outlined in the state-specific EMPs (Appendix C) for wetland crossings. Enbridge would minimize impacts and restore wetlands affected by construction activities, to the extent practical. Pipeline construction through wetlands must comply with COE Section 404 permit conditions and NRCS standards and practices for construction in wetlands (NRCS 2008a).

Enbridge has committed to the following measures in its state-specific EMPs (Appendix C):

- Wetland vegetation would be cut off at ground level and removed from the wetland areas;
- Construction mats would be used, as needed, to facilitate equipment access and pipeline installation and to minimize soil compaction and/or mixing;
- Temporary erosion control devices would be installed prior to trenching activities;
- The top 1 foot of topsoil or the amount of topsoil present, whichever is less, would be stripped over the trench line, segregated, and replaced in unsaturated wetlands;
- Surface water flow would be maintained during construction to the extent practical;

- Wetlands would be restored to pre-construction conditions;
- Wetland hydrology would be maintained by using trench breakers in any area where the potential to drain, or partially drain, a wetland exists, sufficiently compacting the pipeline trench, and placing the pipeline on native material as opposed to gravel;
- Unsaturated wetlands would be revegetated with a temporary crop cover but would be allowed to naturally revegetate with the seeds and rhizomes that occur in the topsoil; and
- Seeding would not be conducted in saturated wetlands, as Enbridge has determined during previous projects that natural revegetation is more successful for these wetlands.

Alternative Construction Methods

In addition to standard construction efforts, alternative construction methods have been proposed for up to approximately 60 miles of super-saturated wetlands that would occur between MP 952 and MP 1074. Of this area, approximately 25 miles (between MP 996 and MP 1003, and between MP 1028 and MP 1046) would be constructed during winter, and the remaining 35 miles would be constructed during summer. Wetlands undergoing alternative construction methods would require a slightly wider construction right-of-way (140 feet) to allow for safe spacing between the existing pipelines and the use of two frost roads (one of which would be used for the Alberta Clipper pipeline and one of which would be used for the Diluent Project), which would result in a 105-foot-wide permanent right-of-way.

As discussed in Section 2.4.3.1, winter pipeline construction is frequently implemented in saturated wetlands in colder climates. The techniques would result in less environmental impact than summer construction as the impacts would not be as long term, and construction equipment could use ice roads that would cause fewer compaction and rutting problems in sensitive habitats. Construction through these areas during winter would eliminate the need for creation or modification of access roads (making use of frost roads instead) and minimize the sloughing of trench walls and wider trenches that would cause additional soil disturbance. One drawback to winter wetland construction, however, is the difficulty in soil segregation—as topsoil and subsoil are often removed together in large blocks as a single frozen layer. Enbridge proposes to minimize those impacts by leaving an insulating mound of snow over the trenchline during construction of the frost roads. In addition, backfilling with frozen soil can create voids that would turn into depressions over the pipeline after summer thaw. Enbridge would minimize the potential for depressions by (1) limiting the amount of open trench to approximately 14,000 feet (as is proposed for summer construction) in order to minimize the time that soil is exposed to aboveground temperatures; and (2) breaking down large blocks of frozen soil to limit the size of the voids created.

The expanded construction and permanent rights-of-way also would be used for up to 35 miles of saturated wetlands that would undergo summer construction due to the risk of soil subsidence that could move or stress the existing adjacent pipelines. Winter construction is not proposed for these areas, although they are saturated, as Enbridge believes that the soils in these areas can accommodate installation in non-frozen conditions. Further, the amount of wetlands proposed for winter construction is limited by contractor availability, the length of the winter construction season, productivity of winter work, and timing restrictions associated with bald eagle nesting periods.

Enbridge has committed to the following winter construction measures in its Winter Construction Plan (Appendix O):

- As soon as wetlands are sufficiently frozen to support it, light construction equipment would begin pushing/packing snow. Progressively heavier equipment would then be driven over the working side to further encourage the depth of freezing.

- In the event of low snowfall prior to construction, the snow necessary to construct the frost road would be made or hauled in.
- The pipe will be strung using specialized stringing equipment designed to minimize ground pressure.
- If final grading and cleanup is not completed until the following spring, temporary slope breakers and sediment barriers would be installed during rough grading.
- Mulch would be applied and anchored to all upland slopes greater than 5 percent, and would be applied as soon as practical after the last grading operation of winter construction.
- Permanent revegetation would be completed in accordance with Enbridge's state-specific Revegetation and Restoration Monitoring Plans (Appendix K) and applicable permit conditions.

Compensatory Mitigation

Enbridge submitted an Application for a Nationwide Permit Number 12 (NWP 12) to the COE Omaha District on January 28, 2009, for wetland crossings that would occur within North Dakota. With the exception of one forested wetland that would be crossed by HDD, thereby avoiding impact, all wetlands crossed in North Dakota would be emergent and would undergo no permanent loss or conversion. For six wetland crossings that are greater than 500 feet (including those at MP 790.7, MP 791.0, MP 791.1, MP 791.5, MP 792.3, and MP 793.0), a Pre-Construction Notice (PCN) would be required and provided to the COE Omaha District that includes a delineation of the area and a description of impacts. A COE engineer would review the PCN and determine whether the action would be allowed. If the action would result in more than a minimal impact the COE would further require that Enbridge seek authorization under an individual permit, Enbridge submit a mitigation proposal that would reduce the adverse effects on the aquatic environment to the minimal level, or Enbridge implement specific modifications as required by the COE. Currently, no compensatory mitigation is proposed for the impacts to wetlands in North Dakota, and none is expected to be required by the COE Omaha District, as none was required for Enbridge's LSr Project that is adjacent to the proposed Project route in North Dakota.

Enbridge would provide compensatory wetland mitigation in Minnesota and Wisconsin for unavoidable permanent and temporary impacts to forested, scrub-shrub, and emergent wetlands. Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA, including—but not limited to:

- Guidelines for Compensatory Wetland Mitigation in Wisconsin, dated February 2002;
- COE St. Paul District Draft Compensatory Mitigation Policy for Minnesota, dated March 14, 2007, and as finalized;
- COE and EPA Final Rule regarding Compensatory Mitigation for Losses of Aquatic Resources, dated April 10, 2008;
- Minnesota Revisor 7050.0186 Wetlands Standards and Mitigation, dated April 1, 2008; and
- COE St Paul District Draft Internal Guidance on Compensating for Wetland Impacts Associated with Utility Projects, dated April 15, 2008.

In addition, for any wetland impacts incurred within the FDL Reservation, wetland permitting and compensatory mitigation requirements would be dictated by FDL's Wetlands Protection and Management Ordinance and associated Wetland Activity Permit (FDL 2008).

The overall objective of Enbridge's proposed compensatory wetland mitigation would be to compensate for wetland aquatic resource functions lost because of the proposed Project, taking into consideration what is available and feasible. Wetland mitigation generally would occur "in place," as defined by applicable guidelines, in that it would be located within one or more of the watersheds or counties in which the wetland impacts occur. The watershed boundaries of the eight-digit USGS Hydrologic Unit Code would be used to evaluate how proposed mitigation contributes to specific water resource needs of the impacted watershed. Enbridge acknowledges that, by applying the watershed approach, the COE St. Paul District may increase required compensation ratios to ensure adequate replacement of lost wetland functions. Appropriate and feasible compensatory wetland mitigation ratios would be established in consultation with the COE. The factors used by the COE to determine mitigation ratios would be those specified in applicable policies and rules, such as whether the proposed mitigation is in kind or out of kind, in place or out of place, in advance or not in advance, or located in an area with greater than or less than 80 percent of its pre-settlement wetland acreage remaining. In general, Enbridge proposes to use in place, in kind, and out of kind mitigation at the time of construction. In advance mitigation has not been specifically proposed although Enbridge acknowledges its consideration for use.

Wetland mitigation currently identified by Enbridge for potential use includes Project-specific wetland restoration or enhancement and creation of upland buffers dominated by native vegetation. Enbridge recognizes the potential need to supplement Project-specific mitigation with the purchase of a small number of wetland banking credits. Due to the limited availability or lack of wetland credits in the Project area, however, Enbridge does not consider wetland banking to be an integral part of its proposed mitigation. Currently, Enbridge has identified potential mitigation sites in the Mississippi River Headwaters Watershed in Minnesota and the Beartrap-Nemadji River Watershed in Wisconsin. Enbridge will submit a final compensatory mitigation plan for COE approval prior to permit issuance, should one be issued.

Mitigation work would be conducted in accordance with a site-specific Mitigation Work Plan that would be developed in consultation with the COE, MDNR, MPUC, and WDNR. The Mitigation Work Plan would define pre-construction and post-construction hydrologic monitoring locations, appropriate seed mixes for various areas, and acceptable plant communities that could be established along the proposed Project.

Enbridge has proposed to conduct post-construction monitoring in wetlands impacted in Wisconsin and Minnesota for a 5-year period to ensure that affected wetlands return to a pre-construction state. All wetland crossings would be inspected during the growing season three times (years 1, 3, and 5) over a 5-year period. During the third-year monitoring event, Enbridge would conduct a wetland functional assessment to determine post-construction elevations for comparison to adjacent undisturbed wetland areas. Should the COE determine that restoration efforts are not satisfactory, Enbridge would conduct remedial work such as regrading or replanting. The final procedures for post-construction monitoring of wetlands associated with the proposed Project would be conducted in accordance with conditions established in the permit(s) issued by the COE.

As previously stated, compensatory mitigation requirements are expected to result in in kind, out of kind, and, in place wetland restoration activities; requirements will be defined within a Compensation Site Plan and the COE permit. Enbridge submitted an application for a Section 404 permit to the COE St. Paul District in November 2008. Within the permit application, and based on requirements approved for Enbridge's LSr pipeline system, a mitigation ratio of 0.03:1 is proposed for temporary and permanent impacts to emergent wetlands. Emergent wetlands tend to restore to pre-construction conditions and functions relatively rapidly (i.e., as emergent wetlands rapidly recover, Enbridge would be required to restore, protect, or create 0.03 acre of emergent wetland for each acre of emergent wetland that would be temporarily impacted). In essence, this approach allows the recovery of the originally impacted emergent

wetland while creating some additional wetland habitat to offset construction impacts. Approximately 248 acres of emergent wetlands would be impacted by the proposed Project. Scrub-shrub and forested wetland communities would be expected to require longer functional restoration times; therefore, mitigation ratios of 0.50:1 would be expected for permanent impacts to these areas, as well as for temporary impacts to forested areas. A mitigation ratio of 0.10:1 is proposed for scrub-shrub communities that would be impacted within the temporary workspaces where woody vegetation would be allowed to reestablish. Approximately 332 acres of scrub-shrub wetlands and 765 acres of forested wetlands would be impacted by the proposed Project.

4.4.3.2 Specially Designated Wetlands

MDNR Public Water Wetlands

In January 2009, Enbridge submitted to MDNR an application for a license to cross public waters in Minnesota. In the application, Enbridge indicates that approximately 1.5 linear miles of wetlands listed as public water wetlands would be crossed by the proposed Project, resulting in 24.0 acres of impact during construction and 14.8 acres of impact during operations. Three of these five wetlands are considered Types 3, 4, and 5 (consistent with the "type" definition of a public water wetland); however, two wetlands are classified as Type 2/6 or 8 due to their presence on applicable MDNR maps (see Table 4.4.3-2). The application notes that one public water wetland (at MP 973) would be crossed by the alternative methods discussed in Section 4.4.3.1; because these methods require wider construction and permanent rights-of-way, they would result in additional impact to wetlands. Impacts to, and mitigation for, public water wetlands would be identical to those discussed in Section 4.4.3.1 for general wetland resources.

Outstanding Resource Value Waters

Of the three calcareous fen or fen-like areas identified, the fen near MP 847 is outside of the proposed pipeline corridor, and the remaining two were avoided by minor re-routes to the pipeline alignment. Therefore, none of the fens would experience direct impacts from construction or operation of the proposed Project. Indirect effects from hydrology changes would be avoided by construction of the pipeline downgradient of the fens. The calcareous fen near MP 854, however, is associated with a cattail marsh that is of special concern to MDNR (see Section 4.5.6.2) and would be minimally impacted by construction of the proposed pipeline. Although the calcareous fen would be avoided, direct impacts to the cattail marsh may be detrimental in turn to the fen; therefore, in Section 4.5.6.2, we have recommended that various measures be implemented to minimize direct impacts to the cattail marsh and indirect impacts to the calcareous fen. These measures would require site-specific species assessments, reseeding plans, and monitoring plans, or as otherwise directed by the applicable agencies. In addition, the fen-like area near MP 893 is associated with rare plants that occur within the right-of-way; impacts to the plants near MP 893 are discussed in Section 4.5.6.2.

NRCS Wetland Reserve Program

Approximately 0.6 linear mile of shallow marsh WRP lands would be crossed by the proposed Project, all within Pembina County, North Dakota. Construction would temporarily impact 8.52 acres, and operations would permanently impact 1.77 acres (see Table 4.4.3-2). Enbridge would implement the measures in its state-specific EMPs (Appendix C) to ensure that these lands remain eligible for the WRP after construction.

TABLE 4.4.3-2
Specially Designated Wetlands Crossed by the Alberta Clipper Project

Mileposts	County, State	Designation	Eggers and Reed Classification	Circular 39 Classification[a]	Cowardin Classification[b]	Crossing Length (feet)	Acres Affected by Construction[c]	Acres Affected by Operation[d]
NORTH DAKOTA								
Lower Red River Watershed								
792.11 – 792.18	Pembina, ND	WRP	Shallow marsh (SM)	Type 3	PEM	410.87	1.11	0.24
792.31 – 792.83	Pembina, ND	WRP	SM	Type 1	PEM	2,840.81	7.41	1.53
North Dakota subtotal						*3,251.68*	*8.52*	*1.77*
MINNESOTA								
Red Lake River Watershed								
853.59 – 853.76	Pennington, MN	MDNR-PW	Deep marsh (DM)	Type 4	PEM	889.94	2.59	0.52
Clearwater River Watershed								
917.71 – 917.87	Clearwater, MN	MDNR-PW	DM	Type 5	PEM	891.80	2.56	1.52
Mississippi River Watershed – Headwaters								
926.76 – 927.40	Beltrami, MN	MDNR-PW	SM, coniferous bog (CB), shallow open water (SOW)	Type 3/6	PEM/PFO/ PUB	2,953.66	9.00	6.05
Mississippi River Watershed – Headwaters								
973.08 – 973.47[e]	Cass, MN	MDNR-PW	WM, SC	Type 2/6	PEM/PSS	2,037.63	6.38	4.71
Prairie River Watershed								
1013.36 – 1026.57	Itasca, MN	MDNR-PW	SM	Type 8	PEM	1,205.26	3.48	1.99
Minnesota subtotal						*7,978.29*	*24.01*	*14.79*

TABLE 4.4.3-2 (continued)
Specially Designated Wetlands Crossed by the Alberta Clipper Project

Mileposts	County, State	Designation	Eggers and Reed Classification	Circular 39 Classification[a]	Cowardin Classification[b]	Crossing Length (feet)	Acres Affected by Construction[c]	Acres Affected by Operation[d]
WISCONSIN[f]								
St. Louis River and Lower Nemadji River Watershed								
1090.79 – 1090.80	Douglas, WI	WDNR-A(PC)	Hardwood swamp (HS)	Type 7	PFO	53.96	1.32	0.21
1090.85 – 1090.85	Douglas, WI	WDNR-A(PC)	Sedge meadow (SEM)	Type 6/2	PEM	12.89	0.02	0.02
1090.88 – 1092.31	Douglas, WI	WDNR-A(PC)	Alder thicket (AT) / HS	Type 6/7	PSS/PFO	1,995.56	10.20	2.64
1090.53 – 1090.66	Douglas, WI	WDNR-S/A(PC)	SEM/AT	Type 6/2	PEM/PSS	220.96	0.76	0.40
1090.68 – 1090.68	Douglas, WI	WDNR-S/A(PC)	SEM	Type 6/2	PEM	0.00	0.01	0.01
1090.73 – 1090.80	Douglas, WI	WDNR-S/A(PC)	SEM/AT	Type 6/2	PEM/PSS	206.99	0.33	0.33
1091.04 – 1091.54	Douglas, WI	WDNR-S/A(PC)	SEM	Type 6/2	PEM	829.51	2.07	2.07
1091.57 – 1091.83	Douglas, WI	WDNR-S/A(PC)	SEM	Type 6/2	PEM	1,314.85	1.69	1.67
1091.84 – 1092.01	Douglas, WI	WDNR-S/A(PC)	SEM/AT	Type 6	PEM/PSS	725.56	1.17	1.04
1092.05 – 1092.17	Douglas, WI	WDNR-S/A(PC)	SEM	Type 2	PEM	0.00	0.01	0.01
1092.06 – 1092.06	Douglas, WI	WDNR-S/A(PC)	SEM/AT	Type 6/2	PEM/PSS	480.25	0.91	0.68
1092.21 – 1092.29	Douglas, WI	WDNR-S/A(PC)	SEM/AT	Type 6/2	PEM/PSS	366.18	0.74	0.56

TABLE 4.4.3-2 (continued) Specially Designated Wetlands Crossed by the Alberta Clipper Project								
Mileposts	**County, State**	**Designation**	**Eggers and Reed Classification**	**Circular 39 Classification[a]**	**Cowardin Classifi-cation[b]**	**Crossing Length (feet)**	**Acres Affected by Construction[c]**	**Acres Affected by Operation[d]**
WISCONSIN[f]								
St. Louis River and Lower Nemadji River Watershed								
1092.29 – 1093.03	Douglas, WI	WDNR-S/A(PC)	SEM/AT	Type 3/6/1	PEM/PSS	3,127.22	7.74	4.68
1093.12 – 1094.00	Douglas, WI	WDNR-A(PC)	SEM/AT	Type 2/6	PEM/PSS	4,603.73	12.12	6.76
1096.01 – 1096.21	Douglas, WI	WDNR-A(SHS)	SEM/Shrub carr (SC)/HS	Type 1/2/6	PEM/PFO/PSS	1,096.21	3.62	1.83
1096.82 – 1096.84	Douglas, WI	WDNR-A(SHS)	SOW	Type 5	PUB	122.58	0.37	0.21
1096.84 – 1096.91	Douglas, WI	WDNR-A(SHS)	AT	Type 6	PSS	357.40	1.25	0.54
1096.93 – 1097.02	Douglas, WI	WDNR-A(SHS)	Seasonally flooded basin/AT	Type 1	PEM/PSS	147.66	0.42	0.26
1097.06 – 1097.62	Douglas, WI	WDNR-A(SHS)	Fresh meadow/AT	Type 6	PEM/PSS	3,159.48	8.63	4.98
Wisconsin subtotal						*23,424.47*	*65.36*	*35.68*

TABLE 4.4.3-2 (continued)
Specially Designated Wetlands Crossed by the Alberta Clipper Project

Notes: Although Outstanding Resource Value Waters are in the vicinity of the Project, they are not located within the proposed pipeline right-of-way; therefore, they would not be impacted during construction or operation of the proposed Project and have been excluded from the table.

MDNR-PW	=	Minnesota Department of Natural Resources – Public Waters.
PC	=	Pokegama Carnegie Wetland Complex.
SHS	=	Superior Airport/Hill Avenue Wetlands/South Superior Triangle Wetland Complex.
WDNR-S/A	=	Wisconsin Department of Natural Resources – State Natural Area/Area of Special Natural Resource Interest.
WDNR-A	=	Wisconsin Department of Natural Resources – Area of Special Natural Resource Interest.
WRP	=	Wetlands Reserve Program.

[a] Based on MDNR Protected Waters Maps, WDNR Surface Water Data Viewer for Areas of Special Natural Resource Interest, and sensitive plant surveys in Wisconsin.

[b] Cowardin classifications:
PEM = Palustrine emergent.
PSS = Palustrine scrub-shrub.
PFO = Palustrine forested.
PUB = Palustrine unconsolidated bottom.

[c] Based on a 125-foot-wide construction right-of-way as well as any required extra workspaces.

[d] Based on a 25-foot-wide permanent right-of-way north of Clearbrook, Minnesota and a 75-foot-wide permanent right-of-way south of Clearbrook that would be permanently maintained in an herbaceous state.

[e] This wetland would be crossed by alternative methods requiring a 140-foot-wide construction right-of-way and a 105-foot-wide permanent right-of-way.

[f] Wetlands between MP 1090.74 and MP 1093.0 have not yet been surveyed in this area; values are estimated on Wisconsin Wetland Inventory data.

State Natural Area/Area of Special Natural Resource Interest

The proposed pipeline would cross the Pokegama Carnegie Wetlands SNA/ASNRI in Douglas County, Wisconsin for a distance of approximately 3.2 miles; 2.6 miles would be through wetland habitat. Construction through wetlands would temporarily impact 39.1 acres of primarily herbaceous and scrub-shrub wetlands; operations would permanently impact 21.1 acres (see Table 4.4.3-2). Enbridge is currently consulting with WDNR and the COE to conduct an alternatives analysis in this area and has developed a Pokegama Construction, Restoration, and Maintenance Plan (Pokegama CRM Plan) (Appendix T) that would minimize impacts to the resource.

In order to utilize the proposed route, Enbridge has proposed in the Pokegama CRM Plan modification of pipe spacing to limit the expansion of the existing right-of-way to 125 feet during construction, of which only 10 additional feet would be added to the permanent right-of-way during operations. Enbridge also proposes to conduct a soil survey to identify hydrologic regimes and microtopographic features so that they can be restored after construction. Additional proposed measures include, but are not limited to, clearing during late summer to avoid wetter soils, minimizing the duration of the construction period to the extent possible, and implementing site-specific soil-stripping and reseeding protocols. WDNR is reviewing the Pokegama CRM Plan to determine the adequacy of proposed mitigation.

In addition to the Pokegama Carnegie Wetlands SNA/ASNRI, the proposed Project would cross the Superior Airport/Hill Avenue/South Superior Triangle ASNRI in Douglas County, Wisconsin for a distance of approximately 1.6 miles; 0.9 mile of the crossing would impact wetland habitat (Table 4.4.3-2). Although no additional mitigation has been proposed by Enbridge for crossing this area, the pipeline was routed to reduce impacts to the extent practical.

4.4.4 Connected Actions

The Superior Terminal Expansion Project is the only connected action associated with the Alberta Clipper Project. Permitting for this action is being conducted separately from the Alberta Clipper Project and will include applicable permits from the COE and WDNR. The Superior Terminal is located at the terminus of the Alberta Clipper pipeline in Douglas County, Wisconsin (MP 1098.1). Five breakout tanks, each with a capacity of 250,000 barrels, would be constructed with the intent to increase petroleum transportation services from supplies in the western Canadian basin to Midwest refineries. In addition to the breakout tanks, an approximately 4,600-foot facility line is proposed for construction.

All undeveloped property owned by Enbridge adjacent to or near the Superior Terminal was delineated in fall 2007 for the presence of wetlands; evaluated for the presence of state and federally-threatened, endangered, and special concern plant species; and assessed for wetland functional value. The breakout tanks are located almost entirely in wetlands. Construction would permanently fill 11.3 acres of wetlands and temporarily impact an additional 3.2 acres of wetland. Two wetland plant species of note occur within the footprint of the tanks: Vasey's rush (*Juncus vaseyi*), which is state-listed as a species of concern, and arrowhead sweet coltsfoot (*Petasites saggitatus*), which is state-listed as threatened. These species are discussed in more detail in Sections 4.8.4 and 4.8.2, respectively. Wetland impacts for the Superior Terminal Expansion Project and the Alberta Clipper Project are provided individually and cumulatively in Table 4.4.4-1. Alternative locations for the Superior Terminal Expansion Project are discussed in Appendix S.

TABLE 4.4.4-1
Wetlands Estimated Impact Summary for the Alberta Clipper Project and Superior Terminal Expansion Project

Wetland Classification[a]	Length of Wetlands Crossed (miles)	Wetland Area Affected during Construction (acres)[b]	Wetland Area Affected by Operations (acres)[c]	Number of Crossings
Superior Terminal Expansion Project[d]				
Alder thicket	N/A	6.39	6.39	N/A
Fresh meadow	N/A	8.06	4.87	N/A
Superior Terminal Expansion Project subtotal	*N/A*	*14.45*	*11.26*	*N/A*
Alberta Clipper Project				
Alder thicket	14.93	236.03	154.02	78
Coniferous bog	20.82	344.91	243.45	39
Coniferous swamp	3.26	51.86	35.37	9
Deep marsh	1.48	10.03	5.35	10
Fresh meadow	4.99	75.03	42.70	88
Hardwood swamp	23.75	368.20	216.63	112
Shrub carr	5.93	96.06	49.02	88
Sedge meadow	1.18	12.66	5.49	16
Seasonally flooded basin	0.86	10.54	3.17	51
Shallow marsh	7.85	118.33	51.13	111
Shallow open water	0.25	1.38	0.37	6
Wet to wet-mesic prairie	1.36	21.12	13.95	40
Alberta Clipper Project subtotal	*86.66*	*1,346.16*	*820.64*	*648*
Combined Project Impacts				
Alder thicket	14.93	242.42	160.41	78
Coniferous bog	20.82	344.91	243.45	39
Coniferous swamp	3.26	51.86	35.37	9
Deep marsh	1.48	10.03	5.35	10
Fresh meadow	4.99	83.09	47.57	88
Hardwood swamp	23.75	368.2	216.63	112

TABLE 4.4.4-1 (continued) Wetlands Estimated Impact Summary for the Alberta Clipper Project and Superior Terminal Expansion Project				
Wetland Classification[a]	**Length of Wetlands Crossed (miles)**	**Wetland Area Affected during Construction (acres)[b]**	**Wetland Area Affected by Operations (acres)[c]**	**Number of Crossings**
Combined Project Impacts (continued)				
Shrub carr	5.93	96.06	49.02	88
Sedge meadow	1.18	12.66	5.49	16
Seasonally flooded basin	0.86	10.54	3.17	51
Shallow marsh	7.85	118.33	51.13	111
Shallow open water	0.25	1.38	0.37	6
Wet to wet-mesic prairie	1.36	21.12	13.95	40
Total combined project impacts	**86.66**	**1360.6**	**831.91**	**648**

[a] Wetlands are classified according to the Eggers and Reed classification system.

[b] Construction impacts include a 125-foot-wide right-of-way as well as any required extra workspaces.

[c] Operations impacts include a 25-foot-wide right-of-way north of Clearbrook, Minnesota and a 75-foot-wide right-of-way south of Clearbrook that would be permanently maintained in an herbaceous state.

Import of fill material would be necessary in order to prepare for the foundations of the breakout tanks to be constructed at the Superior Terminal facility. Approximately 30,000 cubic yards of sand would be required per tank, for an approximate total volume of 150,000 cubic yards. The gravel required per tank would be 3,000 cubic yards, for an approximate total volume of gravel of 15,000 cubic yards. Fill material would be obtained from commercial pits in the Superior, Wisconsin area.

All construction activities for the expansion project would be conducted in accordance with all applicable federal and state permits.

4.4.5 References

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4.5 TERRESTRIAL VEGETATION

Vegetative cover is an important component in the classification of ecoregions that reflects differences in ecosystem quality and integrity (EPA 2007). Ecoregions are described through analysis of patterns and composition of geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The Alberta Clipper Project would cross 11 Level IV Ecoregions of the United States (see Figure 4.1.1-1 and Table 4.5-1).

TABLE 4.5-1
EPA Level IV Ecoregions Crossed by the Alberta Clipper Project

Ecoregion	Location of Occurrence in Alberta Clipper Project Area	Description
Glacial Lake Agassiz Basin	North Dakota	The Glacial Lake Agassiz Basin is an extremely flat patchwork of cultivated farmland. Sediments throughout the basin are lacustrine underlain by glacial till. Because the Red River of the North has a poorly defined floodplain and a very low gradient, flooding can be a problem. Outside of channelized areas in the floodplain, turbid valley streams meander within narrow buffer strips of cottonwood, elm, ash, and willow. Soils range from silty to clayey in texture. Most have high water tables and are extremely productive.
Glacial Lake Agassiz Basin	Minnesota	The Glacial Lake Agassiz Basin is characterized by flat former lake bed dominated by row crops and grains.
Beach Ridges and Sand Deltas	Minnesota	The Beach Ridges and Sand Deltas Ecoregion consists of low ridges of gravel and sand with a mix of row crops, small grains, woodland, and wetlands.
Lake Agassiz Plains	Minnesota	The Lake Agassiz Plains are flat lands higher in elevation than the Glacial Lake Agassiz Basin that contain row crops, small grains, and pasture.
Lake Superior Lacustrine Clay Plain	Minnesota	The Lake Superior Lacustrine Clay Plain is a clay-covered former lake bed that is strongly dissected and characterized by mixed land uses.
Minnesota/Wisconsin Upland Till Plain	Minnesota	The Minnesota/Wisconsin Upland Till Plain consists of a rolling landscape of woods, wetlands, pasture, and crops.
Glacial Lakes Upham and Aitken	Minnesota	The Glacial Lakes Upham and Aitken Ecoregion is characterized by flat former lake beds containing peat and sandy soils that are covered with wetlands, forest, and some pasture.
Toimi Drumlins	Minnesota	Toimi Drumlins are covered with forest and interspersed with wetland depressions.

TABLE 4.5-1 (continued) EPA Level IV Ecoregions Crossed by the Alberta Clipper Project		
Ecoregion	**Location of Occurrence in Alberta Clipper Project Area**	**Description**
Chippewa Plains	Minnesota	The Chippewa Plains are characterized by a mostly level landscape containing forest, crops, pasture, and many lakes.
Nashwauk/Marcell Moraines and Uplands	Minnesota	The Nashwauk/Marcell Moraines and Uplands are characterized by a rolling to steeply sloped landscape with a mix of forest and wetlands.
Alexandria Moraines and Detroit Lakes Outwash Plain	Minnesota	The Alexandria Moraines and Detroit Lakes Outwash Plain is a sub-region of the North Central Hardwoods. The landscape is characterized by elevated knobs and kettles with many lakes and a mix of forest, row crops, and pasture.
Lake Superior Clay Plain	Wisconsin	The Lake Superior Clay Plain is a flat to undulating lake plain and outwash lowland. The soils are generally calcareous red clays with organic deposits in swampy areas. A dearth of lakes, along with a somewhat milder climate and longer growing season due to the climate amelioration by Lake Superior, differentiates this area from surrounding ecoregions. Land use is predominantly woodland with some limited agriculture of hay, small grains, and apples on Bayfield Peninsula, distinguishing this area from most other Level IV Ecoregions in Northern Lakes and Forests, where the land use/land cover is predominantly forest and woodland. The Lake Superior Clay Plain contains boreal forest.

Source: Classification and descriptions of Level IV Ecoregions are based on EPA (2007).

4.5.1 General Vegetation Resources

The vegetation regions crossed by the proposed Project are presented in accordance with the Ecological Classification System (ECS) developed for Minnesota by MDNR and the Forest Service. The ECS is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The system uses associations of biotic and environmental factors, including climate, geology, topography, soils, hydrology, and vegetation to identify the province, section, subsection, land type associations, land types, and land type phases. Vegetation communities are identified within the Project area by province, section, and subsection in Table 4.5.1-1. The four ECS provinces (the largest land classification) that would be crossed by the proposed Project include the prairie parkland, tallgrass aspen parkland, eastern broadleaf forest, and laurentian mixed forest provinces. The prairie parkland province, which coincides with the part of the state that was historically dominated by tallgrass prairie and now favors grasslands, occurs in western Minnesota and into North Dakota. The tallgrass aspen parkland province is dominated by prairie and open, fire-dependent woodland communities and occurs in northwestern Minnesota. The eastern broadleaf forest province occurs in Minnesota and Wisconsin and is transitional in that many forest species reach their western range limits and several prairie species reach their eastern range limits within the province. The laurentian mixed forest province traverses northern

Minnesota and Wisconsin and is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

TABLE 4.5.1-1
Ecological Classifications Crossed by the Alberta Clipper Project

State	Milepost		Ecological Classification System (Minnesota)			
	In	Out	Province	Section	Subsection	Description (Section/Subsection)
ND[a]/MD	773.8	833.8	Prairie parkland	Red River Valley	Red River Prairie	Flattest, driest region of MN. Most important land use is agriculture. Native flora persists in fragments.
MN	833.8	896.2	Tallgrass aspen parklands	Lake Agassiz, Aspen Parklands	Aspen Parklands	Mainly sandy deposits with loamy till, and clay and silt. Agricultural land dominates; native flora remnants are more common than in the Red River Prairie.
MN	896.2	915.3	Eastern broadleaf forest	Minnesota and NE Iowa Morainal	Hardwood Hills	Deciduous forest, woodland, and prairie. Agricultural land dominates with lesser amounts of wetlands and upland forest.
MN	915.3	1002.1	Laurentian mixed forest	N. MN Drift and Lake Plains	Chippewa Plains	Mesic forests and acid peatland communities. Forestland dominates with agricultural land being locally important in the west.
MN	1002.1	1002.6	Laurentian mixed forest	N. MN Drift and Lake Plains	St. Louis Moraines	See description above. Forestland dominates and timber harvest is extensive.
MN	1002.6	1002.9	Laurentian mixed forest	N. MN Drift and Lake Plains	Chippewa Plains	See descriptions above.
MN	1002.9	1014.4	Laurentian mixed forest	N. MN Drift and Lake Plains	St. Louis Moraines	See descriptions above.
MN	1014.4	1024.2	Laurentian mixed forest	N. MN Drift and Lake Plains	Tamarack Lowlands	See description above. Forestland dominates.
MN	1024.2	1027.4	Laurentian mixed forest	N. MN Drift and Lake Plains	St. Louis Moraines	See descriptions above.
MN	1027.4	1055.0	Laurentian mixed forest	N. MN Drift and Lake Plains	Tamarack Lowlands	See descriptions above.

TABLE 4.5.1-1 (continued) Ecological Classifications Crossed by the Alberta Clipper Project						
	Milepost		Ecological Classification System (Minnesota)			
State	In	Out	Province	Section	Subsection	Description (Section/Subsection)
MN	1055.0	1072.0	Laurentian mixed forest	Northern Superior Uplands	North Shore Highlands	Bedrock outcroppings and shallow soil. Forestland dominates.
MN	1072.0	1077.7	Laurentian mixed forest	Western Superior Uplands	Mille Lacs Uplands	Forests and fire-dependent woodlands, with peatlands and other wetlands present. Agricultural lands dominate in the west and south; forestlands in the east and central.
MN	1077.7	1084.8	Laurentian mixed forest	Southern Superior Uplands	Glacial Lake Superior Plain	Wet and dry mesic forests. Forestland dominates, a significant amount of which is undeveloped.
WI[b]	1084.8	1097.8	Laurentian mixed forest	Southwest Lake Superior Clay Plain	Superior Coastal Plain	Clay plain forest/grassland dominates, fragmented by agricultural use.

[a] North Dakota does not have a natural community classification system available for the portion of the proposed Project in North Dakota; therefore, community characteristics are in accordance with Minnesota classifications.

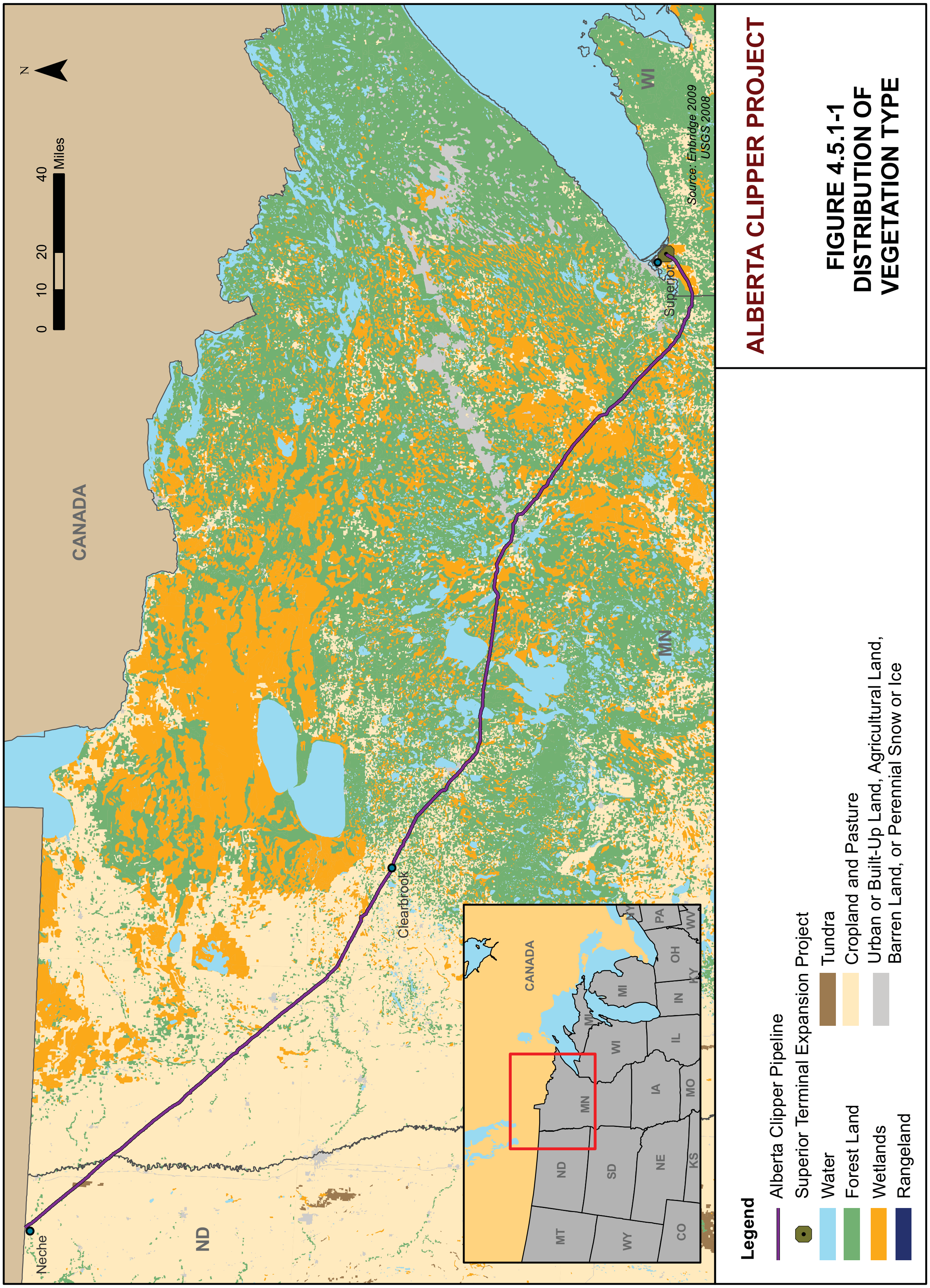
[b] Wisconsin is classified based on the National Hierarchical Framework of Ecological Units. The ecological landscape of the Superior Coastal Plain has not been comprehensively inventoried. If classified by Minnesota Ecological Classification System, the land in Wisconsin would be classified identically to the adjoining land in Minnesota (i.e., the Glacial Lake Superior Plain).

Sources: MDNR 2008, WDNR 2008a, McNab et al. 2007.

In addition to the ECS, Project-wide impacts to vegetation have been assessed for specific vegetation types, including agricultural land (cropland and pasture), open land (grassland/rangeland), upland forest, wetlands (emergent, shrub/scrub, and forested), and streams and open water areas that support naturally occurring vegetation. Developed lands (residential, commercial, and industrial lands) primarily include artificially created landscapes with minimal naturally occurring vegetation. Figure 4.5.1-1 depicts the distribution of vegetation by type along the proposed Alberta Clipper route.

4.5.2 Vegetation Communities of Conservation Concern

Vegetation communities of conservation concern that occur along the proposed Project route include native prairie remnants, calcareous fens, pristine forested lands, and other native plant communities. These communities are listed in Table 4.5.2-1. Species of conservation concern that occur within these habitats are discussed in Section 4.8.4.



ALBERTA CLIPPER PROJECT

FIGURE 4.5.1-1
DISTRIBUTION OF
VEGETATION TYPE

TABLE 4.5.2-1
Vegetation Communities of Conservation Concern Occurring along the Alberta Clipper Project Route

Milepost	County	Type	Crossing Method	Notes
Minnesota				
816.9	Kittson	Mesic prairie remnant	Bore	Within railroad corridor.
846.6	Marshall	Wet brush prairie and calcareous fen	N/A	The proposed pipeline is downgradient of the prairie and fen.
853	Pennington	Mixed cattail marsh native community	N/A	Site of Outstanding Biodiversity Significance – Downgradient pipeline crossover proposed to avoid impacts to the fen and minimize impacts to the cattail marsh.
853.7	Pennington	Calcareous fen	N/A	Site of Outstanding Biodiversity Significance – Downgradient pipeline crossover proposed to avoid impacts.
886	Red Lake	Mesic and wet prairie	Bore	Along railroad corridor.
890	Polk	Mesic and wet prairie	Bore	Along railroad corridor.
893	Polk	Calcareous fen-like area	N/A	Downgradient pipeline re-route to avoid impacts to the area; consultation with MDNR is ongoing to minimize impacts to adjacent special status species.
1054 – 1061	St. Louis	Northern wet cedar forest	Open cut	Site of Moderate Biodiversity Significance.
1061 – 1064	Carlton	Northern wet cedar forest	Open cut	Site of Moderate Biodiversity Significance.
1069 – 1087	Carlton	Native deciduous forest and coniferous forest and wetlands	Open cut	Site of Moderate Biodiversity Significance; adjacent to existing utility corridor.
Wisconsin				
1085.3 – 1085.6	Douglas	Managed Forest	Open cut	Managed Forest Law land.
1085.6 – 1085.8	Douglas	Managed Forest	Open cut	Forest Crop Law land.
1085.8 – 1086.1	Douglas	Managed Forest	Open cut	Forest Crop Law land.

TABLE 4.5.2-1 (continued) Vegetation Communities of Conservation Concern Occurring along the Alberta Clipper Project Route				
Milepost	**County**	**Type**	**Crossing Method**	**Notes**
Wisconsin (continued)				
1086.6 – 1086.8	Douglas	Managed Forest	Open cut	Managed Forest Law land.
1087.4 – 1087.7	Douglas	Managed Forest	Open cut	Managed Forest Law land.
1088.2 – 1088.2	Douglas	Managed Forest	Open cut	Forest Crop Law land.
1088.2 – 1088.3	Douglas	Managed Forest	Open cut	Managed Forest Law land.
1088.9 – 1089	Douglas	Managed Forest	Open cut	Forest Crop Law land.
1091 – 1094	Douglas	Pokegama Carnegie Wetlands State Natural Area – Area of Special Natural Resource Interest	Open cut	Neck-down to minimize the width of new right-of-way to 10 feet through the area. Additional mitigative measures will be handled through the WDNR Chapter 30 permit.
1096 – 1098	Douglas	Superior Airport/Hill Avenue/South Superior Triangle Area of Special Natural Resource Interest	Open cut	Requires a WDNR Chapter 30 permit.

MDNR = Minnesota Department of Natural Resources.
N/A = Not applicable.
WDNR = Wisconsin Department of Natural Resources.

Native grasslands or prairies are considered one of the most threatened vegetation communities in the United States. In the past, grasslands such as the tall-grass prairies, mixed-grass prairies, and short-grass prairies dominated central North America. Fragments of native prairie habitats remain in some locations throughout the Alberta Clipper Project area; however, most native prairie habitats in North Dakota, Minnesota, and Wisconsin have been lost because of conversion of land to agricultural or urban uses. Consultation with MDNR has indicated that there are four instances of native prairie and one instance of a native cattail marsh community occur along the proposed right-of-way (Table 4.5.2-1). Many of the states' endangered, threatened, or special concern species are dependent on native prairie habitats, warranting protection of these remaining fragments. Several sensitive plants associated with wet and mesic prairie remnants occur along the Alberta Clipper Project right-of-way.

Calcareous fen wetlands are designated as Outstanding Resource Value Waters, as discussed in Section 4.4. Consultation with MDNR has indicated that two calcareous fens occur along the proposed right-of-way, and Enbridge has identified one area with fen-like characteristics at MP 893 that has yet to be classified by MDNR (Table 4.5.2-1). Numerous sensitive plants associated with these three wetland areas occur along the Alberta Clipper Project right-of-way. Two Wisconsin-designated SNA/ASNRIs, the Pokegama Carnegie wetland complex and the Superior Airport/Hill Avenue/South Superior Triangle wetland complex, would also be crossed by the proposed pipeline in Douglas County (see Table 4.5.2-1 and Section 4.4).

Native forests, especially forested floodplains, are also of conservation concern. Forested lands provide wildlife habitat and high-quality water (in the form of runoff) and help regulate the natural carbon cycle. Native wooded communities were once an integral component of the landscape throughout the Great Plains. Many of these communities have been lost due to land conversion to agricultural uses, levee construction, and urban development.

The proposed Project would be collocated along the existing Enbridge pipeline right-of-way through the CNF, a forested area of concern. The CNF is located in north-central Minnesota and would be crossed by the proposed Project for a total of approximately 34 miles. The CNF is managed by the Forest Service and includes lands owned by the LLBO. As such, potential impacts to the CNF have been assessed in additional detail and are further discussed in Appendix U. The proposed pipeline also would be collocated with an existing Enbridge right-of-way across the FDL Reservation; however, no special vegetative areas of concern have been reported to occur along that portion of the proposed route.

4.5.3 Lands Managed by NRCS and FSA

Lands managed by NRCS and FSA that would be crossed by the proposed Project include parcels enrolled in the CRP, WRP, and EWP Program. CRP lands are administered by FSA, with NRCS providing land eligibility determinations as well as conservation planning and practice implementation. The CRP provides financial assistance to eligible farmers and ranchers in order to encourage landowners to conduct environmental enhancement projects on their lands. The Project would cross five parcels enrolled in the CRP in North Dakota and 63 parcels in Minnesota. The WRP, administered by NRCS in consultation with FSA, is a similar program that offers financial support to landowners who want to protect, restore, and enhance wetlands on their property. Two WRP easements were identified along the Project route, both in North Dakota (Table 4.4.3-2). The EWP Program, managed by NRCS, provides emergency funds in the event of a fire, flood, or any other natural occurrence that has caused a sudden impairment of the watershed. Two EWP parcels would be crossed in North Dakota. No CRP, WRP, or EWP lands would be crossed in Wisconsin. CRP lands are further discussed in Section 4.9. WRP easements are further discussed in Section 4.4.

4.5.4 Forest Crop Law/Managed Forest Law

The Forest Crop Law (FCL) is a landowner incentive program that encourages long-term, sustainable management of private woodlands (40 contiguous acres or more) by reducing and deferring property taxes. The program was enacted in 1927, and enrollment was closed on January 1, 1986; lands are enrolled for a period of 25 or 50 years and must be transitioned into the Managed Forest Law (MFL) program after expiration to retain tax benefits (WDNR 2009). Similar to FCL, the MFL program, enacted in Wisconsin in 1985, also allows private landowners to obtain tax relief benefits by enrolling their forested lands as MFL lands for a period of 25 or 50 years. Enrollment is free and voluntary; however, landowners must have 10 or more acres of contiguous forestlands with a minimum forest cover of 80 percent, an average land width of at least 120 feet, and a minimum productive capacity of 20 cubic feet of timber per acre per year. Enrollment in the MFL also protects against overcutting and encourages expansion of forested lands. Approximately 2 million acres of forestland in Wisconsin are enrolled as MFL lands and administered by the WDNR (WDNR 2008b). The proposed Project would cross eight FCL or MFL easements in Douglas County, Wisconsin (Table 4.5.2-1).

4.5.5 Noxious Weeds

Noxious weeds and other invasive plants are undesirable as are introduced species that could exclude and out-compete desirable native species, thereby decreasing overall species diversity. The term “noxious weed” is legally defined under both federal and state laws. Under the Federal Plant Protection Act of

2000 (formerly the Noxious Weed Act of 1974 [7 USC SS 2801–2814]), a noxious weed is defined as "any plant or plant product that can directly or indirectly injure or cause damage to crops, livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment." The Federal Plant Protection Act contains a list of 137 federally restricted and regulated noxious weeds (as per CFR Title 7, Chapter III, Part 360), including 19 aquatic and wetland weeds, 62 parasitic weeds, and 56 terrestrial weeds. Each state is federally mandated to uphold the rules and regulations set forth by the Federal Plant Protection Act and to manage its lands accordingly. Three federally-listed noxious weeds have been reported to occur in states that would be crossed by the construction right-of-way, including giant hogweed, dodder hydrilla, and mile-a-minute (USDA 2008).

Noxious weeds also are addressed by EO 13112, which directs federal agencies to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species can cause. The Executive Order further specifies that federal agencies shall not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere, unless it has been determined that the benefits of such actions outweigh the potential harm caused by invasive species and that all feasible and prudent measures to minimize the risk of harm will be taken in conjunction with the actions.

Each state that would be crossed by the proposed Project maintains a list of regulated and prohibited noxious and invasive weed species. Based on these state lists, 165 additional state-listed noxious and invasive weeds potentially occur in the Project area; the most widespread include Canada thistle, field bindweed, leafy spurge, nodding plumeless (musk) thistle, and purple loosestrife. County weed control boards or districts are present in most counties that would be crossed by the pipeline route. These county weed control boards monitor local weed infestations and provide guidance on weed control.

Project-specific consultation with the NRCS identified 13 weed species of particular concern for North Dakota and Minnesota. Similarly, WDNR identified 37 species of concern for Wisconsin and the CNF/LLBO identified 25 species of concern for lands within the CNF/LLR (see Table 4.5.5-1). To determine the presence of invasive species in the Project vicinity, Enbridge surveyed the entire pipeline corridor between June and September 2008 for select species identified by the NRCS, WDNR, and the CNF/LLBO. Twelve of the targeted species were identified across the Project route (see Table 4.5.5-1).

Noxious weeds, although of concern within the FDL Reservation, have not yet become a large problem on the reservation, due in part to the Resource Management staff that clean and decontaminate field equipment (FDL 2008). In addition, no noxious weeds targeted by a field survey in spring 2008 were documented within the FDL Reservation.

TABLE 4.5.5-1 Noxious Weeds of Concern in the Proposed Alberta Clipper Project Area					
		Identifying Agency[a]			
Common Name	**Scientific Name**	**NRCS (ND and MN)**	**WDNR**	**CNF/LLBO**	**Identified in 2008 Survey (State/Location)**
Garlic mustard	***Alliaria petiolata***	X	X	X	
Black alder	***Alnus glutinosa***		X		
Wormwood	*Artemisia absinthium*			X	
Flowering rush	***Butomus umbellatus***		X		
Hoary alyssum[b]	*Berteroa incana*			X	
Hemp	*Cannabis sativa*			X	
Siberian peashrub	*Caragana arborescens*			X	
Plumeless thistle[b]	*Carduus acanthoides*			X	
Musk thistle	*Carduus nutans*			X	
Oriental bittersweet	***Celastrus orbiculatus***		**X**		
Field sandbur[b]	*Cenchrus longispinus*			X	
Spotted knapweed[b]	***Centaurea maculosa***	X	**X**	X	X (MN, CNF/LLBO)
Oxeye daisy	*Leucanthemum vulgare*	X	**X**	X	
Canada thistle[b]	***Cirsium arvense***	X	**X**	X	X (ND, MN, CNF/LLBO)
European marsh thistle	***Cirsium palustre***		**X**		
Bull thistle[b]	***Cirsium vulgare***	X	**X**	X	X (MN)
Poison hemlock	***Conium maculatum***		**X**		
Field bindweed[b]	***Convolvulus arvensis***	X	**X**	X	X (ND, MN)
Grecian foxglove	***Digitalis lanata***		**X**		
Common teasel	***Dipsacus fullonum subsp. sylvestris***		**X**		
Cut-leaved teasel	***Dipsacus laciniatus***		**X**		
Autumn olive	***Elaeagnus umbellate***		**X**		
Leafy spurge[b]	***Euphorbia esula***	X	**X**	X	X (ND)
Queen-of-the-meadow	***Filipendula ulmaria***		**X**		
Glossy buckthorn	***Frangula alnus***		**X**		
Hemp nettle	***Galeopsis tetrahit***		**X**		
Giant hogweed	***Heracleum mantegazzianum***		**X**		

TABLE 4.5.5-1 (continued) Noxious Weeds of Concern in the Proposed Project Area					
		Identifying Agency[a]			
Common Name	**Scientific Name**	**NRCS (ND and MN)**	**WDNR**	**CNF/LLBO**	**Identified in 2008 Survey (State/Location)**
Dame's rocket	***Hesperis matronalis***		**X**		
Orange hawkweed/ devil's paintbrush [b]	***Hieracium aurantiacum***	X	**X**	X	
Meadow hawkweed	***Hieracium caespitosum***		**X**		
Japanese hops	***Humulus japonicus***		**X**		
Common St. Johnswort	*Hypericum perforatum*			X	
Honeysuckle	***Lonicera japonica***		**X**		
Bird's-Foot trefoil	***Lotus corniculata***		**X**		X (MN, WI)
Purple loosestrife	***Lythrum salicaria***	**X**	**X**	**X**	X (MN, WI)
Eurasion watermilfoil	*Myriophyllum spicatum*			X	
Wild parsnip	***Pastinaca sativa***		**X**	X	
Reed canary grass	***Phalaris arundinacea***		**X**		X (MN, WI)
Phragmites	***Phragmites australis***		**X**		
Japanese knotweed	***Polygonum cuspidatum***		**X**		
Curlyleaf pondweed	*Potamogeton crispus*			X	
Tall buttercup	*Ranunculus acris*	X		X	
Common buckthorn	***Rhamnus cathartica***		**X**	X	
Perennial sowthistle[b]	***Sonchus arvensis***	**X**		**X**	X (ND, MN)
Common tansy[b]	***Tanacetum vulgare***	**X**	**X**	**X**	X (MN, CNF/LLBO)
Japanese hedge-parsley	***Torilis japonica***		**X**		
Rydberg poison ivy[b]	***Toxicodendron rydbergii***	**X**		**X**	X (MN, CNF/LLBO)
Narrow-leaf cattail	***Typha agustifolia***		**X**		X (WI)
Garden heliotrope	***Valeriana officinalis***		**X**		X (WI)

TABLE 4.5.5-1 (continued) Noxious Weeds of Concern in the Proposed Project Area					
		Identifying Agency[a]			
Common Name	**Scientific Name**	**NRCS (ND and MN)**	**WDNR**	**CNF/LLBO**	**Identified in 2008 Survey (State/Location)**
Black swallow wort	***Vincetoxicum nigrum***		X		

Notes: ND = North Dakota, MN = Minnesota, WDNR = Wisconsin Department of Natural Resources, CNF/LLBO = Chippewa National Forest/Leech Lake Band of Ojibwa, WI = Wisconsin. No noxious weeds were found within the boundaries of the Fond du Lac Reservation.

Bolded entries indicate species that were surveyed for.

[a] Species were only surveyed for in the states/areas for which they were identified.

[b] These species were identified within the CNF/Leech Lake Reservation during previous surveys.

4.5.6 Potential Impacts and Mitigation

Total miles crossed and acres of terrestrial vegetation affected during construction and operation of the Alberta Clipper Project are presented in Table 4.5.6-1. Potential construction- and operations-related effects include:

- Temporary and permanent modification of vegetation community composition and structure from clearing and operational maintenance;
- Increased risk of soil erosion due to lack of vegetative cover;
- Expansion of invasive and noxious weed populations along the pipeline right-of-way as a result of construction and operational vegetation maintenance;
- Loss of sensitive plant species and habitats as a result of construction clearing and grading;
- Soil and sod disturbance (mixing of topsoil with subsoil, with altered biological activities and chemical conditions that could affect reestablishment and natural recruitment of native vegetation after restoration);
- Compaction and rutting of soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns, inhibiting seed germination, or increasing siltation;
- Alteration in vegetation productivity and phenology due to increased soil temperatures associated with heat input from the pipeline; and
- Spread of oak wilt, an aggressive disease that affects many species of oak (*Quercus* spp.).

TABLE 4.5.6-1
Estimated Impacts on Vegetation Communities for the Alberta Clipper Project[a]

Vegetation Community Classification	Additional Temporary Workspace Required (acres)	Construction Right-of-Way (acres)[b]	Permanent Right-of-Way (acres)[c]
North Dakota			
Forested	0.1	1.3	0.2
Agricultural	17.4	406.8	72.9
Developed	1.6	0.0	0.0
Open	1.7	15.6	2.8
Wetlands[d]	0.2	28.9	6.2
North Dakota subtotal	*21.0*	*452.6*	*82.1*
Minnesota			
Forested	53.4	1,132.0	584.7
Agricultural	225.6	1,875.8	495.2
Developed	538.9	68.7	35.6
Open	247.3	365.5	176.7
Wetlands[d]	18.8	1,194.9	756.6
Minnesota subtotal	*1,084*	*4,636.9*	*2,048.8*
Wisconsin			
Forested	1.6	66.1	37.3
Agricultural	0.5	2.7	1.3
Developed	5.6	2.4	1.1
Open	0.6	24.7	15.7
Wetlands[d]	1.7	101.7	57.9
Wisconsin subtotal	*10.0*	*197.6*	*113.3*
Project-Wide			
Forested	55.1	1,199.4	622.2
Agricultural	243.5	2,285.3	569.4
Developed	546.1	71.1	36.7
Open	249.6	405.8	195.2
Wetlands[d]	20.7	1,325.5	820.7

TABLE 4.5.6-1 (continued) Estimated Impacts on Vegetation Communities for the Alberta Clipper Project[a]			
Vegetation Community Classification	**Additional Temporary Construction Areas (acres)**	**Construction Right-of-Way (acres)[b]**	**Permanent Right-of-Way (acres)[c]**
Project total	**1,115.0**	**5,287.1**	**2,244.2**

[a] Acreages include impacts of the Southern Lights Diluent Project and are therefore considered conservative for the Alberta Clipper Project.

[b] Construction right-of-way is based on a standard 140-foot-wide corridor in uplands and a standard 125-foot-wide corridor in wetlands.

[c] Permanent right-of-way is based on a standard 25 foot-wide corridor north of Clearbrook, Minnesota and a 75-foot-wide corridor south of Clearbrook (combined Alberta Clipper and Southern Lights Diluent Projects).

[d] Total wetland impacts include both forested and non-forested wetlands.

Source: USGS 1998.

4.5.6.1 General Vegetation Resources

The primary impacts to vegetation from construction and operation of the Alberta Clipper Project would be cutting, clearing, or removing the existing vegetation within the construction work area and potential invasion by noxious weeds. The degree of impact would depend on the type and amount of vegetation affected, the rate at which vegetation would regenerate after construction, and the frequency and type of vegetation maintenance conducted on the right-of-way during pipeline operation.

Impacts to herbaceous habitats generally would be shorter term than those to woody communities, with herbaceous vegetation typically becoming reestablished within 3 years. Impacts to these herbaceous communities during operation of the pipeline would be minimal because these areas would be allowed to recover following construction and typically would not require maintenance mowing. Impacts on annually tilled croplands also would be short term and typically limited to one growing season, provided that topsoil segregation was maintained and soils were not compacted during construction. Additional discussion of soil mitigation measures is provided in Section 4.2.2.

Clearing trees within upland forest communities, including riparian forest, would result in long-term impacts to these vegetation communities within the construction work areas, given the length of time needed for the community to mature to pre-construction conditions. Permanent impacts would occur within the permanent right-of-way, where trees would be removed and prevented from reestablishing through the periodic mowing and brush clearing required for pipeline operation and inspections. Permanent impacts could also result from the spread of oak wilt, an aggressive disease that affects many species of oak (*Quercus* spp.) and is considered one of the most serious tree diseases in the eastern United States (O'Brien et al. 2000). Impacts to the carbon cycle from tree clearing are discussed in Section 4.14.3.12.

Impacts to shrubland would generally last approximately 5 to 10 years because of the time required to reestablish the woody vegetation characteristic of this community type. Permanent impacts to shrubland would result during operation from the periodic removal of woody vegetation within the permanent right-of-way in non-riparian areas. These clearing activities would prevent larger woody species from reverting to pre-construction form and size.

During operations, Enbridge would aerially inspect the right-of-way on a bi-weekly basis to detect abnormal conditions or evidence of third-party damage. Right-of-way maintenance in both upland and wetland areas would include the removal of woody vegetation by mechanical means, such as use of a rubber-tracked skid-steer vehicle with specialized cutting equipment, to allow for the aerial inspections. Maintenance would include the removal of vegetation that has grown to a diameter of 2 to 3 inches and a height of 10 to 15 feet, and clearing would generally occur every 5 to 10 years during fall or winter. Herbaceous growth would generally not be removed. The width of the right-of-way that would be maintained would be in accordance with the individual easement for a particular parcel.

Pipeline operations would be expected to cause a slight increase in soil temperatures at the soil surface (from 1 to 2 ˚F primarily during winter) and at depths of 6 inches (from 1 to 5 ˚F with the most notable increase during spring). While many species would not produce root systems that would penetrate much below 6 inches, the root systems of some species often penetrate well below 6 inches. Soil temperatures at a depth of about 5 feet in the immediate vicinity of the pipeline may be as much as 30 ˚F warmer than the ambient surrounding soil temperatures (TransCanada 2007). According to available studies, the effects of temperature on crop yields for gas pipelines, which run hotter than oil pipelines, have not caused significant adverse impacts to crops (Dunn and Carlson 2007, Fisher et al. 2000). In general, increased soil temperatures during early spring would cause early germination and emergence in annual crops, such as corn and soybeans, and in tall-grass prairie species. Increased soil temperatures also could stimulate root growth in oak species (TransCanada 2007). During winter, increased pipeline temperature generally would result in the absence or reduction of frost in the immediate vicinity of the pipeline, and anecdotal information indicates that there could be a reduced frozen soil depth and duration (Dunn 2008). Impacts to vegetation from potential spills and accidents during operations are discussed in Section 4.13.5.4.

To reduce impacts to vegetation within the construction and permanent right-of-way and to improve the probability of successful revegetation of disturbed areas, Enbridge would implement the following measures in its state-specific EMPs (Appendix C) and Revegetation and Restoration Monitoring Plans (Appendix K):

- Temporary and permanent erosion control measures would be implemented.
- Access to the right-of-way would be from public roadways and approved private roads.
- Construction workspaces would be clearly marked prior to commencement of clearing, and grading activities and would be located at least 50 feet from waterbodies or wetlands, where applicable, to maintain a vegetative buffer.
- Tree removal would be minimized to the extent possible, particularly in areas containing windbreaks and shelterbelts.
- Appropriate topsoil segregation methods would be employed to reduce the potential for mixing soil layers during construction.
- Fertilizer and soil pH modifiers (e.g., lime) would be applied in accordance with local state and federal agencies and landowners.
- Seeding would follow cleanup and topsoil replacement as soon as weather and soil conditions permit. Seed would be applied to all disturbed surfaces (except cultivated fields, unless requested by the landowner).
- The final seed mixes, as determined in consultation with the NRCS, would be the standard mix unless an alternative seed mix is specified by landowners or land managing agencies.

- Seeds would be purchased in accordance with Pure Live Seed specifications for the seed mix, would be used within 12 months of testing, and would be certified "noxious weed free."
- Any drill seeder would uniformly distribute the seed at the desired application rate and sow it at the required depth.
- Broadcast or hydro-seeding may be used in lieu of drilling. For these uses, the recommended seeding rates would be doubled; and a harrow, cultipacker, or other equipment would be used immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.
- Temporary mulch would be evenly applied following seeding except on cultivated fields, unless specifically requested by the landowner.
- After seeding, slopes greater than 5 percent or dry, sandy areas would be mulched with 2 tons per acre of straw.
- All areas of dormant seeding would be mulched with 2 tons per acre of straw within 48 hours of seeding.
- If soil conditions allow, a mulch anchoring tool or farm disc set in the straight position would be used to crimp the mulch to a depth of 2 to 3 inches; in special circumstances, liquid tackifiers may be used by the contractor with advanced written approval from Enbridge. Typical liquid tackifiers are not stated to be ecologically hazardous according to Material Safety Data Sheets; however, similar to herbicide use, Enbridge would avoid runoff and use of tackifiers near waterbodies.

As the spread of oak wilt has the potential to cause severe impacts to oak species in the proposed Project area, MPUC has recommended various measures to avoid impact from the spread of this disease. Therefore, in accordance with MPUC permitting requirements, **we recommend that:**

- **In counties where oak wilt occurs, and when construction occurs through forested areas containing oak trees, Enbridge should take care to avoid damage between April 1 and July 1 to any live, standing residual oak trees adjacent to the right-of-way. If any such damage does occur, the damaged areas on the trees should be immediately covered with pruning or latex paint.**

In addition to these mitigation measures, Enbridge would enhance existing riparian forest in Minnesota by planting woody species between the newly installed and existing Enbridge pipelines to the nearby tree line or up to 50 feet from the ordinary high water mark. In addition, Enbridge is committed to conducting voluntary mitigation in the form of habitat restoration and/or tree planting. Potential areas for the voluntary mitigation include a 70-acre parcel in Pembina County, North Dakota as well as a 200-acre parcel near Trail, Minnesota (which Enbridge previously acquired). Enbridge is also engaged in ongoing coordination with Pheasants Forever to identify an area in north-central Minnesota for habitat restoration. The final location of mitigation lands would be determined in coordination with land managing agencies, private conservation groups, and individuals.

4.5.6.2 Vegetation Communities of Conservation Concern

If pipeline construction occurred on previously untilled native prairies, the effects may be irreversible, as destruction of the prairie sod during trenching may require more than 100 years for recovery. Short-grass prairie and mixed-grass prairie areas may take 5 or more years to become reestablished due to poor soil conditions and low moisture levels.

Native prairies, calcareous fens, and the cattail marsh generally would be avoided during construction of the proposed Project. Native prairies occurring along the proposed pipeline right-of-way would be within existing railroad rights-of-way and would be crossed by horizontal bore, as recommended by MDNR, avoiding impacts to the plant communities. Impacts to the Pokegama Carnegie Wetlands SNA/ASNRI in Douglas County, Wisconsin, as discussed in Section 4.4, would be minimized through the use of Enbridge's proposed Pokegama CRM Plan (Appendix T) for the area. WDNR is reviewing the proposed Plan and may require additional measures to minimize or avoid impacts to the habitat and plant species. Impacts to the Superior Airport/Hill Avenue/South Superior Triangle ASNRI were minimized during routing, and no further mitigation is proposed.

Impacts to the calcareous fen near MP 847 and the fen-like area near MP 893, as well as the northern wet cedar forest at MP 1055, would be avoided as they are outside of the currently proposed construction right-of-way. In addition, impacts to the calcareous fen habitat and cattail marsh (between MP 853 and MP 854) would be avoided or minimized by constructing the pipeline downgradient of the area to avoid potential impacts to hydrology and on the opposite side of the right-of-way from the more sensitive portion of the native community. To further minimize impacts to these habitats, Enbridge would implement measures in its state-specific EMPs (Appendix C), Revegetation and Restoration Monitoring Plans (Appendix K), and Noxious Weed Plans (Appendix H) to ensure that no sediment flows off right-of-way areas, disturbed areas are reseeded with appropriate seed mixes, and revegetation occurs in a way that eliminates or minimizes the potential for noxious weed invasion.

Although the fen-like area near MP 893 would be avoided, adjacent special-status plants would still be located within the right-of-way. Enbridge has proposed to minimize impacts to these plants by conducting a "sedge salvage" operation in which the ditch containing the rare plants would be temporarily removed to a depth that would include intact root structure and subsequently replanted after construction, followed by 2 years of post-construction monitoring. MDNR is reviewing Enbridge's proposed mitigation; however, MDNR staff are also reviewing site conditions to determine if compensatory mitigation would be more appropriate than implementation of Enbridge's proposed "sedge salvage" operation.

Of specific concern is the presence of calcareous fen habitat and the cattail marsh between MP 853 and MP 854 mentioned above. Impacts to the sensitive vegetation at this location would be minimized by construction of the pipeline downgradient of the area and on the north side of the right-of-way where the habitat is less sensitive. To further minimize impacts to this habitat, and in accordance with current or expected COE, MDNR, and MPUC permitting requirements, **we recommend that:**

- **Enbridge develop a Construction and Mitigation Plan (CMP) for the wetland complex located between MP 853 and MP 854, for approval by the COE at least 1 week prior to construction that provides, among other things, an endangered resource plan; identification and inventory of existing plant communities; a preliminary wetland restoration plan; a replanting and reseeding plan; and a preliminary 5-year, site-specific post-construction monitoring plan—or as otherwise directed by the COE for the Alberta Clipper Project; and**

- **Enbridge take all necessary and reasonable measures to protect the wetland complex between MP 853 and MP 854, and submit proposed site plans to MDNR and MPUC 14 days prior to construction through the area, or as otherwise directed by MDNR and MPUC for the Alberta Clipper Project.**

Native forests, especially forested floodplains, are also of conservation concern. Native wooded communities were once an integral component of the landscape throughout the Great Plains. Many of

these communities have been lost due to land conversion to agricultural uses, levee construction, and urban development. An estimated 1,254.5 acres of upland forests and 765.0 acres of forested wetlands would be cleared during construction of the Project. Of this acreage, an estimated 622.2 acres of upland forests and 495.5 acres of forested wetland would not be allowed to reestablish within the permanently maintained right-of-way. While these areas represent a relatively small proportion of the total area affected by construction of the Alberta Clipper Project, these forested communities are already reduced in many areas.

Enbridge would implement the following measures in its state-specific EMPs (Appendix C) for forested uplands and wetlands:

- Prior to the start of clearing, the Project boundaries would be clearly staked, including the pipeline right-of-way and pre-approved temporary workspaces, to prevent disturbance to unauthorized areas.
- Landowners would be consulted to determine whether any trees are of commercial or other value to the landowner. Timber would be salvaged as requested by the landowner.
- To facilitate proper cleanup and restoration in upland areas, tree stumps outside the ditchline would be ground no less than 4 inches below normal ground surface or removed and hauled off to an approved disposal facility. Stumps in the ditch line would be completely removed and ground or hauled off to an approved disposal facility.
- Non-merchantable timber and slash would be disposed of by mowing, chipping, grinding, or hauling off site to an approved disposal facility. Non-merchantable timber must not be disposed of by placing it off the right-of-way.
- Trees would be cut in such a way that they fall toward the center line of the right-of-way, to avoid breaking trees and branches into the right-of-way.
- Woody debris would be disposed of in a licensed disposal facility or in a non-agricultural upland area approved by Enbridge and the landowner that is in accordance with applicable laws and ordinances.

4.5.6.3 Lands Managed by NRCS and FSA

Temporary and permanent impacts to lands managed by NRCS and FSA generally would be the same as those described above for vegetation. Construction of the Project would impact 290.5 acres of these lands, and 52.4 acres would be permanently impacted. The large majority of this impact would be to CRP lands in Minnesota. The total area of CRP parcels in Minnesota impacted by construction would be 257.7 acres, of which 46.6 acres would be permanently impacted. Within North Dakota, impacts to CRP lands would be approximately 16.3 acres during construction and 2.9 acres during operations. The area of the WRP easements impacted by construction along the Project route would be 8.5 acres, of which 1.8 acres would be permanently impacted (all in North Dakota). Approximately 8.5 acres of EWP land would be impacted by construction, with 1.5 acres impacted permanently (all in North Dakota).

To reduce impacts to CRP lands by construction and operation of the proposed Project, Enbridge would:

- Reseed CRP lands at the direction of the landowners' CRP requirements; and
- Establish temporary cover within the CRP.

Enbridge has not provided specific mitigation for other WRP or EWP lands that would be impacted during construction and operation of the proposed Project; however, mitigation measures discussed in the

Enbridge's state-specific EMPs (Appendix C), Noxious Weed Plans (Appendix H), and Revegetation and Restoration Monitoring Plans (Appendix K) would minimize impacts to these lands to ensure that the lands remain eligible for these programs.

4.5.6.4 Forest Crop Law/Managed Forest Law

A total of 4.5 acres of forested land within the FCL and MFL programs would be permanently cleared by construction and operation of the proposed Project. Upon replanting of the temporary workspaces and construction right-of-way, seven of the easements would be eligible to remain in the applicable program. Two easements, an FCL easement at MP 1085.8 and an MFL easement at MP 1087.4, are being surveyed to determine whether additional plantings would allow the easements to remain in the program. If the land was disqualified from the program, Enbridge would address the repercussions of withdrawal from the program as part of the easement agreement process with the landowners. One MFL easement at MP 1085.3 would be withdrawn from the program; Enbridge has entered into a voluntary agreement with the landowner to compensate for lost tax benefits.

4.5.6.5 Noxious Weeds

After disturbances to the soil, vegetation communities can be susceptible to infestations of invasive or noxious weed species. Vegetation removal and soil disturbance during construction could create favorable conditions for the establishment of undesirable species. Construction equipment traveling from weed-infested areas into weed-free areas could disperse invasive or noxious weed seeds and propagates, resulting in the establishment of noxious weeds in previously weed-free areas.

A number of tribes and federal and state agencies requested that disturbed areas be revegetated with native plant species that currently are found in the Alberta Clipper Project area. Enbridge is continuing to consult with CNF/LLBO to develop a long-term plan to control noxious weeds; however, LLBO has stated that certified weed-free mulch would be required within the boundaries of the reservation. FDL has also indicated that herbicide use, as proposed in Enbridge's Noxious Weed Plans (Appendix H) would be prohibited from use within the reservation and that certified noxious weed-free seed mixes, mulch, and straw must be used throughout the FDL Reservation. In addition, Enbridge has agreed to recommend to private landowners that revegetation occur using native species. The ultimate decision on the revegetation approach would be made by each individual landowner. Enbridge proposes to control the introduction and spread of noxious weeds by implementing the construction and restoration procedures detailed in its Noxious Weed Plans (Appendix H). These plans include measures to:

- Reseed disturbed areas with "noxious-weed-free" seed mixes that have been recommended by local soil conservation authorities, land management agencies, or landowners.
- Thoroughly clean all construction equipment prior to moving the equipment to the job site, as well as after leaving areas of noxious weed infestation, using compressed air. High-pressure water wash stations may be established in select areas if the above measures do not adequately remove soil and vegetation debris from construction equipment.
- Prior to clearing and grading of the construction right-of-way and pending landowner permission, major infestation areas identified during surveys would be treated with the recommended herbicides, where appropriate, and mechanical removal methods.
- Retain documentation of the areas in which herbicide was used to treat noxious weeds.
- Implement BMPs for vegetation control, including the use of agricultural herbicides in consultation with county or state regulatory agencies, based on the weed species requiring control.

- Initiate final seeding within 48 hours of final grading, pending appropriate weather and soil conditions, to prevent the establishment of noxious weed seeds that may be present.
- Treatment of known infestations will be completed prior to clearing and grading activities.

In addition, Enbridge has stated that restoration of the right-of-way in non-agricultural areas would be considered successful when the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. If this monitoring indicates a higher density and cover of noxious weeds on the right-of-way compared to adjacent off-right-of-way areas, Enbridge would take appropriate measures to control the noxious weeds. The measures implemented may include herbicide spraying, mowing, or burning. Enbridge is continuing to consult with CNF/LLBO, and FDL to determine appropriate control measures. MPUC however, has specifically stated that the density of non-nuisance vegetation would need to be greater than 70 percent of the density of adjacent vegetation; therefore, in accordance with permitting requirements from MPUC, **we recommend that:**

- **Revegetation in non-agricultural areas be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density (i.e., greater than 70 percent) and cover to adjacent undisturbed lands.**

4.5.7 Connected Actions

The primary impacts to vegetation from construction of the Superior Terminal Expansion Project would be associated with cutting, clearing, and removing existing vegetation within the construction work area and potential invasion by noxious weeds. As discussed in Section 4.4.4, the Superior Terminal Expansion Project would require 14.5 acres of non-forested wetlands in an area previously disturbed by construction activities. Any impact to terrestrial vegetation would be limited to mowed grass areas or weeds within the Superior Terminal.

4.5.8 References

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4.6 WILDLIFE

The Alberta Clipper Project area supports a diversity of wildlife, including big and small game animals, furbearing animals, waterfowl, and game and migratory birds. Wildlife habitats in the Alberta Clipper Project area include evergreen and deciduous forests, shelterbelts, riparian areas, wetlands, grasslands and pastures, and agricultural lands. These vegetation communities provide forage, cover, and breeding habitats for a wide variety of northern wildlife.

This section describes wildlife resources and discusses potential impacts of the proposed pipeline on wildlife in the region crossed by the Alberta Clipper Project. The information contained in this section was compiled using input and correspondence from federal, tribal, and state agencies, state natural heritage programs, agency websites, and other applicable websites.

4.6.1 Wildlife Resources

Representative big game animals, small game animals, furbearers, waterfowl, and game birds, as well as their habitats and estimated 2006–2007 state harvest are described in Table 4.6.1-1. Most game animals, game birds, and waterfowl are hunted during fall. Furbearers generally are harvested during fall and winter by trapping or shooting. Non-game animals are not specifically discussed; however, they would be affected by the proposed Project in a manner similar to that of game species.

TABLE 4.6.1-1
Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route

Class and Species	Occurrence and 2006–2007 Harvest Estimate			Habitat
	ND	MN	WI	
MAMMALS				
Big Game Animals				
American black bear (*Ursus americanus*)	P	√ 3,290	√ 2,797	Prefer mixed deciduous-coniferous forests with thick understories but may occur in various habitats. This is a protected furbearer in North Dakota; however, the species is not known to occur within the Project area in North Dakota.
Elk *(Cervus canadensis)*	√ 22	√ 2		Found over a range of habitats. Use open areas, such as alpine pastures, marshy meadows, river flats, and aspen parkland—as well as coniferous forests, brushy clear cuts or forest edges, and semi-desert areas. Small hunting zone in Marshall County, Minnesota, located north of Grygla. In 2008, a new hunting area was approved in Kittson County, Minnesota, near Lancaster.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
MAMMALS (continued)				
Big Game Animals (continued)				
Moose (*Alces alces*)		√ 208	P	Prefer mosaic of second-growth forest, openings, swamps, lakes, and wetlands. Require water bodies for foraging and hardwood-conifer forests for winter cover. Avoid hot summer conditions by using dense shade or bodies of water. Limited hunting—Minnesota season availability depends on population statuses; no season for the northwestern portion of the state since 1997. This species is protected in Wisconsin and is closed to hunters within the Project area in North Dakota.
Mountain lion or cougar *(Puma concolor)*	√ 5	P	P	Require vast undeveloped areas containing rugged terrain with dense vegetation; mostly found in the Badlands and areas associated with the Missouri River in North Dakota. Hunting is statewide in North Dakota—in the southwestern corner of the state, a five-animal quota exists; no quota for the rest of the state due, in part, to lack of suitable habitats.
White-tailed deer (*Odocoileus virginianus*)	√ 109,676 ±1,031	√ 270,778	√ 507,224	Most abundant big game mammal occurring in all habitats, from forest to fields and in urban and rural settings. During winter, snow depth may limit movements and foraging; often use timber stands for cover and may aggregate or "yard." May become a pest foraging on crops and hay. Forage on grasses in spring, forbs in early summer, and leafy green browse and mushrooms throughout summer. Widely hunted throughout the Project area.
Small Game Animals				
Bobcat *(Lynx rufus)*	√ 139	√ ~890	√ 300	Found throughout northern Minnesota forests, such as young aspen forests and cedar swamps.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
MAMMALS (continued)				
Small Game Animals (continued)				
Coyote (*Canis latrans*)	√ 57,600	√ ~21,000	√ 21,830	Wide ranging and found in virtually all habitats (rural, urban, and suburban). Often considered pest species, especially by the livestock industry. Control programs have been largely ineffective.
Eastern cottontail rabbit (*Sylvilagus floridanus*)	√ 20,000	√ ~78,000	√ ~250,000	Very adaptable species. Inhabits cropland (row, small grain, and legume)/hedgerow (shrubby fencerows), grassland/herbaceous, old field/pasture, shrubland/chaparral, suburban/orchard, woodland-hardwood, woodland-mixed forest, and forest edge habitats. Constructs burrows in or using soil and fallen log/debris. Nests usually in shallow depressions, thick vegetation, or underground burrows. Found primarily in the southern two-thirds of Minnesota, in the Prairie Grassland and Deciduous Forest biomes. Widely hunted in Minnesota, where it is considered the most common rabbit species.
Eastern fox squirrel (*Sciurus niger*)		√ ~66,000	√ ~245,000	Found in open mixed hardwood forests or mixed pine-hardwood associations; species also has adapted well to disturbed areas, hedgerows, city parks, and residential areas. Western range extensions are associated with riparian corridors of cottonwoods and fencerows of Osage-orange. Den in tree hollows or leaf nests. Widely hunted, with annual harvests near 100,000. Note: harvest for Wisconsin squirrels is not species specific, split evenly between fox and gray squirrels.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	Occurrence and 2006–2007 Harvest Estimate			Habitat
	ND	MN	WI	
MAMMALS (continued)				
Small Game Animals (continued)				
Eastern gray squirrel (*Sciurus carolinensis*)	√ 10,000	√ ~141,00 0	√ ~245,000	Prefer mature deciduous and mixed hardwood forests with abundant supplies of acorns and hickory nuts. Diversity of nut trees needed to support high densities. Use city parks and floodplain forests. Seldom far from permanent open water. Nest in tree cavities or in leaf nests, usually 25 feet or more above ground. Widely hunted, with annual harvests of several hundred thousand. In North Dakota, found along the Red River and its tributaries and the northeastern forest zones.
North American porcupine *(Erethizon dorsatum)*		√	√	Prefer coniferous and mixed forests; also inhabit riparian areas, grasslands, and shrublands. Den in hollow trees or logs during winter; may use dense conifers as shelter.
Opossum (*Didelphis marsupialis*)		√ ~20,000	√ 31,533	Use cropland/hedgerow, grassland/ herbaceous, old field, shrubland/chaparral, suburban/orchard, forested wetlands, herbaceous wetland, and riparian habitats. Also use forest and woodland hardwood, and mixed forest. Construct burrows in or using soil, fallen logs/debris, and standing snags or hollow trees. Very adaptable; may be found in most habitats. Prefer wooded riparian habitats. Also in suburban areas. Generally use abandoned burrows, buildings, hollow logs, and tree cavities for den sites.
Snowshoe hare *(Lepus americanus)*	√	√ ~17,000	√ ~35,000	Found in wooded coniferous forests containing thick understories in lowland areas and areas with young aspen or spruce trees and cedar swamps. Thrive in the northern part of Minnesota in dense woodlands and forest bogs. Hunting in Minnesota depends on population status. In North Dakota, distribution is primarily in the Turtle Mountains and Pembina Hills areas, where few game hunters pursue them.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
MAMMALS (continued)				
Small Game Animals (continued)				
White-tailed jack rabbit *(Lepus townsendii)*	√	√ ~4,000	√ ~8,000	Inhabits farm country and other open lands, using nearly brush for cover. During the winter, hollows in the snow with connected tunnels are used to hide; they may also gather along tree rows and the edges of woody plots. Hunting occurs during autumn and early winter with several thousand taken each year in Minnesota.
Furbearers				
American badger *(Taxidea taxus)*	√ 3,800	√ ~1,000	P	Found in open areas and brushlands with little groundcover. Den in underground burrows. This species is protected in Wisconsin.
American beaver (*Castor canadensis*)	√ 19,400	√ ~76,000	√	Inhabit permanent sources of water of almost any type in its range (which extends from arctic North America to Gulf of Mexico and arid Southwest) and from sea level to over 6,800 feet in mountains. Prefer low-gradient streams, which they modify), ponds, and small mud-bottomed lakes with outlets that can be dammed. Associated with deciduous tree and shrub communities.
American marten *(Martes americana)*	P	√ 3,788	P	Prefer dense deciduous, mixed, or coniferous upland and lowland forest. Den in hollow trees or rock den. When inactive, occupy abandoned squirrel nest, burrows, or holes in trees or stumps. This is a protected furbearer in North Dakota and a state-endangered species in Wisconsin.
American mink (*Mustela vision*)	√ 2,600	√ ~26,000	√ 24,690	Occur in wetlands, riparian woodlands, lake and river edges, and near ponds.
Ermine *(Mustela erminea)*		√ ~8,000	√	Found in a variety of habitats; prefer wooded areas with dense understories located near watercourses. Den in hollow logs or under logs, stumps, roots, brushpiles, or rocks.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
MAMMALS (continued)				
Furbearers (continued)				
Fisher *(Martes pennanti)*	P	√ 3,251	√ 2,450	Found in upland and lowland forests, including coniferous, mixed, and deciduous forests. Prefer areas with dense overhead coverage and areas of contiguous interior forest, avoiding areas with significant human disturbance. This is a protected furbearer in North Dakota; however, the species is not known to occur within the Project area.
Gray fox (*Urocyon cinereoargenteus*)		√ ~4,000	√ 2,414	Found in a variety of habitats, including chaparral, rimrock, riparian, old fields, and early-successional-stage woodlands. Usually prefer diversity of open and wooded areas rather than large tracts of homogeneous habitat. Annual harvests estimated at only a few thousand.
Least weasel *(Mustela nivalis)*		√	√	Found in a variety of habitats, including open forests, farmlands and cultivated areas, grassy fields and meadows, riparian woodlands, hedgerows, alpine meadows, scrub, prairies and sometimes rural residential areas. Den in abandoned underground animal burrows or under debris.
Long-tailed weasel *(Mustela frenata)*	√ 85	√ ~3,000	√ 9,308	Found in a variety of habitats, usually near water. Prefer brushland and open woodlands, field edges, riparian grasslands, swamps, and marshes. Den in abandoned animal burrows, rock crevices, brushpiles, hollow stumps, or among tree root spaces.
Muskrat *(Ondatra zibethicus)*	√ 81,300	√ ~243,000	√ 523,906	Prefer fresh or brackish marshes, lakes, ponds, swamps, and other slow-moving water. Typically found in areas with cattail. Den in bank burrows or conical houses of vegetation located in shallow water.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
MAMMALS (continued)				
Furbearers (continued)				
North American river otter *(Lontra canadensis)*	P	√ 2,720	√ 1,458	Found in rivers, lakes, streams, ponds, and marshes near wooded forests. Remain active year-round; when resting or with young, occupy dense thickets, hollow logs, or abandoned burrows of other animals. This is a protected furbearer in North Dakota; however, the species is not known to occur within the Project area.
Raccoon (*Procyon lotor*)	√ 36,300	√ ~63,000	√ 167,195	Found in variety of habitats (both rural and urban) but prefer riparian and edges of wetlands, ponds, streams, and lakes. Often den together in small groups. Have been known to den in wood duck boxes if the openings are large enough. Widely hunted throughout Project area.
Red fox (*Vulpes vulpes*)	√ 11,000	√ ~8,000	√ 9,236	Found in various open and semi-open habitats. Usually avoid dense forest, although open woodlands are frequently used. Sometimes occur in suburban areas or cities. Maternity dens are in burrows dug by fox or abandoned by other mammals, often in open fields or wooded areas; sometimes under rural buildings, in hollow logs, or under stumps. Widely hunted In Minnesota, with annual harvest estimates near 100,000.
Striped skunk (*Mephitis mephitis*)	√ 23,500	√ ~11,000	√ 9,692	Prefer semi-open country with woodland and meadows interspersed with brushy areas, and bottomland woods. Frequently found in suburban areas. Den under rocks, logs, or buildings. May excavate burrow or use burrow abandoned by other mammals. Occur throughout Minnesota, but most common along the western border; least common in the northeast.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate ND**	**MN**	**WI**	**Habitat**
WATERFOWL				
Dark Geese				
Canada goose (*Branta canadensis*)	√ 108,922	√ 203,469	√ 114,200	Found in various habitats near water, from temperate regions to tundra. Usually breed and feed in areas near lakes, ponds, large streams, and inland and coastal marshes. Forage in pastures, cultivated lands, grasslands, and flooded fields. Widely hunted, with an estimated Mississippi Flyway harvest of 1.2 million and Central Flyway harvest of 615,000 in 2007.
White-fronted goose (*Anser albifrons*)	√ 528			
Light Geese				
Snow goose (*Chen caerulescens*)	√ 13,599	√ 1,011	√	Found in various habitats near water, from temperate regions to tundra. Winter in both freshwater and coastal wetlands, wet prairies, and extensive sandbars; forage in pastures, cultivated lands, and flooded fields. Widely hunted, with an estimated Mississippi Flyway harvest of 158,000 and Central Flyway harvest of 304,000 in 2007.
Ross's goose (*Chen rossii*)	√ 528			
Tundra swan *(Cygnus columbianus)*	√ 611			Inhabit lakes, sloughs, rivers, and fields during migration. Winter in shallow lakes, ponds, and estuaries.
Dabbling Ducks				
American black duck *(Anas rubripes)*		√ 540	√ 1,856	Found along shallow margins of lakes, streams, bays, mud flats, and open waters. Nest in both dry and wet woodlands. Usually nest in concealed vegetation on the ground; occasionally use abandoned tree nests of other bird species. Not widely hunted, with estimated Mississippi Flyway harvest of 39,000 in 2007.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
WATERFOWL (continued)				
Dabbling Ducks (continued)				
American wigeon (*Anas americana*)	√ 12,476	√ 12,417	√ 11,138	Primarily found in shallow waters, such as ponds, lakes, marshes, and flooded fields; in migration and in winter, mostly found in fresh water and cultivated fields, less commonly in brackish situations. Widely hunted, with estimated Mississippi Flyway harvest of 5.4 million and Central Flyway harvest of 1.5 million during 2007.
Blue-winged teal or cinnamon Teal (*Anas discors* or *Anas cyanoptera*)	√ 26,097	√ 60,196	√ 30,232	
Gadwall (*Anas strepera*)	√ 57,159	√ 24,834	√ 19,094	
Green-winged teal (*Anas crecca*)	√ 18,077	√ 49,399	√ 48,530	
Mallard (*Anas platyrhynchos*)	√ 171,224	√ 178,969	√ 171,048	
Northern shoveler (*Anas clypeata*)	√ 19,987	√ 10,798	√ 9,016	
Northern pintail (*Anas acuta*)	√ 11,585	√ 13,227	√ 11,668	
Wood duck *(Aix sponsa)*	√ 1,528	√ 80,981	√ 67,889	Found near quiet inland waters near woodland, such as wooded swamps, flooded forest, greentree reservoirs, ponds, marshes, and along streams. Nest in holes in large trees (elms and maples) in forested wetlands, usually near water and forest canopy openings. Widely hunted; estimated Mississippi Flyway harvest of 622,000 and Central Flyway harvest of 75,000 in 2007.
Diving Ducks				
American coot (*Fulica americana*)	√ 3,700	√ 5,100	√ 3,300	Commonly found on marshes, ponds, lakes, rivers, and bays. Widely hunted, with estimated Mississippi Flyway harvest of 115,000 and Central Flyway harvest of 24,900 during 2007.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
	Occurrence and 2006–2007 Harvest Estimate			
Class and Species	**ND**	**MN**	**WI**	**Habitat**
WATERFOWL (continued)				
Diving Ducks (continued)				
Bufflehead (*Buchephala albeola*)	√ 3,437	√ 9,718	√ 8,486	Commonly found on marshes, ponds, lakes, rivers, and bays.
Canvasback (*Aythya valisineria*)	√ 6,111	√ 8,098	√ 8,486	Widely hunted, with estimated Mississippi Flyway harvest of 567,000 and Central Flyway harvest of 243,000 during 2007.
Greater scaup (*Aythya marila*)	√	√ 1,890	√ 3,978	
Hooded merganser (*Lophodytes cucullatus*)	√ 255	√ 1,890	√ 3,131	
Other mergansers (*Mergus* spp.)	√ 0	√ 540	√ 1,061	
Lesser scaup (*Aythya affinis*)	√ 16,168	√ 12,147	√ 5,834	
Redhead (*Aythya americana*)	√ 21,387	√ 18,896	√ 5,304	
Ring-necked duck (*Aythya collaris*)	√ 4,965	√ 68,024	√ 14,586	
Common moorhen *(Gallinula chloropus)*		√		Found in freshwater marshes, canals, quiet rivers, lakes, and ponds—primarily in areas of emergent vegetation and grassy borders. Infrequently fly; however, northern populations make extensive migrations to and from breeding and wintering areas. Nest among marsh plants over water, occasionally in shrubs in or near water building nest-like platforms. Extremely low harvest numbers reported for the entire Mississippi Flyway; an estimated 300 during 2007, down from 11,800 in 2006.
Goldeneyes (*Bucephala* sp.)	√ 255	√ 9,448	√ 4,773	Commonly found on ponds and lakes, less common on rivers and lakes. Nest usually near water but may nest in woodlands in natural tree cavities or woodpecker holes. Estimated Mississippi Flyway harvest of 26,000 and Central Flyway harvest of 9,500 in 2007.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	Occurrence and 2006–2007 Harvest Estimate			Habitat
	ND	MN	WI	
WATERFOWL (continued)				
Diving Ducks (continued)				
Long-tailed duck *(Clangula hyemalis)*		√ 290	√ 1,591	Found near large inland lakes and rivers; breeding on lake islands and by pools, concealing nests in vegetation. Estimated Mississippi Flyway harvest of 2,800 in 2007.
Ruddy duck *(Oxyura jamaicensis)*	√ 1,528	√ 1,350	√ 1,326	Found on marshes, lakes, and rivers; nest on floating structures on freshwater marshes, sloughs, lakes, and ponds with open water areas bordered by dense aquatic vegetation. Estimated Mississippi Flyway harvest of 11,000 and Central Flyway harvest of 3,700 in 2007.
Scoters (*Melanitta* sp.)	√ 127		√ 1,856	Found on freshwaters; nesting on lakes or slow-moving streams in wooded, bushy, or overgrown vegetation. Low harvest numbers reported for the Mississippi and Central Flyways; an estimated 4,400 and 400 during 2007.
GAME BIRDS				
American crow *(Corvus brachyrhynchos)*	√	√ ~69,000	√ ~70,000	Inhabit open country or partly open agricultural and suburban areas, and orchards. Primarily found in riparian forests, avoiding dense coniferous forest. Nest in trees and shrubs of open forest and woodlands or on utility poles in urban areas.
American woodcock (*Scolopax mir*)	√	√ 34,400	√ 48,000	Wetlands, marshes, moist woodlands, and thickets. Woodcock harvest in the Central Flyway of 290,000 during 2007.
Gray partridge or Hungarian partridge *(Perdix perdix)*	√	√ ~11,000	√ ~200	Introduced game bird; primarily associated with croplands; nest in non-irrigated cropland, such as alfalfa. Also, nest in areas of sagebrush-grass vegetation. Hunted throughout North Dakota; however, their primary range is in the western half of the state.

TABLE 4.6.1-1 (continued)
Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route

Class and Species	Occurrence and 2006–2007 Harvest Estimate			Habitat
	ND	MN	WI	
GAME BIRDS (continued)				
Greater prairie chicken or pinnated grouse (*Tympanuchus cupido*)	√ 30	√ 92	P	Inhabit tall grassland prairies and occasionally croplands. Nest in grasslands, prairies, pastures, and hayfields. Harvest in Minnesota is confined to counties along the northwestern border between North Dakota. This is a state-threatened species in Wisconsin and a species of special concern in Minnesota where limited hunting permits are reviewed and issued each season.
Mourning dove (*Zenaida macroura*)	√ 48,700	√ 67,400	√ 202,000	Inhabit open woodlands, forest edge, cultivated lands with scattered trees and bushes, and arid and desert country. Widely hunted—20.5 million estimated harvest during 2007.
Northern bobwhite or quail (*Colinus virginianus)*		√	√ ~1,100	Found in a variety of vegetation type habitats, including croplands, grasslands, pastures, fallow fields, grass-brush rangelands, and habitat mosaics. Prefer patchy landscapes with scattered row crops and grasslands near woody edge habitat.
Rails (King rail [*Rallus elagans*], Virginia rail [*R. limicola*]; Sora [*Porzana carolina*])		√	√ 700	Prefer grain fields in winter and during migration. During migration, use open habitats, such as dry hayfields. Breed in emergent wetlands, grass, or sedge marshes; nesting in large marshes composed of mixed sedge and bulrush, with cattails in the deeper areas. Not widely hunted—3,500 estimated harvest in the Mississippi Flyway during 2007.
Ring-necked pheasant (*Phasianus colchincus*)	√	√ ~588,00 0	√ ~340,000	Non-native game bird; inhabit open country (especially cultivated areas, scrubby wastes, open woodland, and edges of woods), grassy steppe, desert oases, riverside thickets, swamps, and open mountain forest. Winter shelter includes bushes and trees along streams, shelterbelts, and fencerows. Usually nest in fields, brushy edges, or pastures; also along road rights-of-way. Nest is shallow depression scratched out by female.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	**Occurrence and 2006–2007 Harvest Estimate**			**Habitat**
	ND	**MN**	**WI**	
GAME BIRDS (continued)				
Ruffed grouse (*Bonasa umbellus*)	√	√ ~417,00 0	√ ~240,000	Inhabit a variety of habitat types, including mixed and deciduous woodlands. Widely hunted—Minnesota's most popular game bird.
Sandhill crane (*Grus canadensis*)	√ 3,906	√	√	During migration, roost at night along river channels, on alluvial islands of braided rivers, or natural basin wetlands. Communal roost site consisting of an open expanse of shallow water is key feature of wintering habitat. Nest in wetland habitats within Minnesota and Wisconsin where they are not hunted. Hunted during fall in North Dakota.
Sharp-tailed grouse (*Tympanuchus phasianellus*)	√	√ ~12,000	√ 28	Inhabits short to tall grasslands intermixed with cropland and shrublands. Not widely hunted in Wisconsin; typical harvests are in the hundreds.
Spruce grouse *(Falcipennis canadensis)*		√ ~27,000		Prefer the short-needled trees of coniferous forests; from boreal and wet spruce forests to jack pine-spruce, jack pine, or spruce-fir forests. Generally found in forests with good understories; areas that provide them with good cover for ground-nesting. In winter, they roost and feed in trees, preferring jack pine uplands.
Wild turkey (*Meleagris gallopavo*)	√	√ 10,030	√ 57,253	Resident game birds found in forest, open woodland, scrub oak, and deciduous or mixed deciduous-coniferous forests. Also use agricultural areas, which may provide important food resources. Roost in trees at night and nest on ground, usually in open areas at the edge of woods. Widely hunted in Minnesota; hunting is limited to the southern part of the state.

TABLE 4.6.1-1 (continued) Wildlife Resources That Potentially Occur along the Alberta Clipper Project Route				
Class and Species	Occurrence and 2006–2007 Harvest Estimate			Habitat
	ND	MN	WI	
GAME BIRDS (continued)				
Wilson's snipe (*Gallinago delicata*)	√ 200	√ 1,400	√ 3,600	Wetlands, marshes, moist woodlands, and thickets. Snipe harvest in the Central and Mississippi Flyways of 48,000 during 2007.

√ = Indicates that the species occurs in the state.

P = Indicates that the species occurs in the state but is protected from hunting or trapping.

~ = Indicates approximate harvest estimate.

Sources: (For occurrence/harvest information) Dexter 2007; Dhuey 2007a; Dhuey and Olson 2007a, 2007b, 2007c; Garshelis and Noyce 2008; Haroldson 2007; Isackson 2007; Jensen et al. 2007; Kitchell 2007; Larson and FWP&RG 2007a, 2007b; Lenarz and FWP&RG 2007; MDNR 2007a, 2007b; NDGFD 2006, 2007, 2008; Olson 2007-2008; Sharp et al. 2007; FWS 2007a, 2007b, 2008b; WDNR 2008a, 2008b; Watermolen and Murrell 2001; Wilson 2005, 2008. (For habitat information) NatureServe 2008.

4.6.1.1 Big Game Animals

White-tailed deer is the predominant big game animal along the proposed pipeline right-of-way. White-tailed deer are highly adaptable, inhabiting a variety of habitats such as croplands, grasslands, shrublands, orchards, and woodlands—often in close association with humans. In the northern portions of their range, white-tailed deer aggregate or "yard" during winter in forested stream bottoms, along south-facing slopes, and in other areas where snow accumulations are reduced.

Black bears are uncommon but may exist in the Project area. A small breeding population of black bears was thought to exist in the Pembina River valley within about the past decade (Johnson 1998). Black bears are rare and are currently a protected furbearer in North Dakota (NDGFD 2008). In Minnesota, black bears are centralized in the northern half of the state, where their primary food sources of berries, acorns, insects, bird eggs, honey, and deer fawns are abundant. Most harvested bears are taken in the northeast portion of the state. Black bears have been sighted and harvested on and near the FDL Reservation in St. Louis and Carlton Counties, Minnesota. Black bears are hunted throughout Wisconsin, but their primary range is the northern third of the state.

Elk have been reintroduced into isolated wildlife areas and may occur near the proposed pipeline right-of-way in the northeast corner of North Dakota and in Minnesota. Elk were reintroduced into Minnesota in 1913, and currently there are two herds: one on public and private lands in Beltrami County (near Grygla and the Red Lake Game Preserve), and one along the Manitoba/Kittson County border. Limited hunting of the Grygla herd has been allowed to manage the population level and protect surrounding croplands. An elk hunting zone was recently opened in Kittson County, Minnesota, in the Lancaster vicinity.

Moose occur in the Project area in the northeastern portion of North Dakota; however, this area is closed to hunting. In Minnesota, moose are restricted to the northern portion of the state with hunting allowed only in the northeast corner. Moose hunting is prohibited in Wisconsin, where a combination of parasites common to white-tailed deer and unregulated hunting caused their earlier disappearance by the early 1900s.

Mountain lion (also known as cougar) are rare but may occur within the Project area. Mountain lion are hunted in North Dakota, but their primary range is in the southwest corner of the state, hundreds of miles west of the proposed Alberta Clipper Project right-of-way. Mountain lion have been sighted on and near the FDL Reservation in St. Louis and Carlton Counties in Minnesota. Mountain lion are not considered game animals in Minnesota and Wisconsin. Mule deer and pronghorn antelope also occur in North Dakota, but their ranges occur west of the proposed pipeline right-of-way.

4.6.1.2 Small Game Animals and Furbearers

Common small game animals and furbearers hunted or trapped in the Project area include squirrels, cottontails, raccoons, opossums, muskrats, mink, and coyotes. Squirrels depend on forested habitats, usually deciduous or mixed hardwood forests with abundant supplies of acorns and hickory nuts. Cottontails, raccoons, opossums, and coyotes use a vide variety of habitats, including croplands, hedgerows, and forested habitats. Many furbearers are associated with water and wetlands, such as muskrats, ermine, otters, weasels, mink, raccoons, and beavers.

4.6.1.3 Waterfowl and Game Birds

All ducks, geese, swans, coots, and sandhill cranes occurring within the Alberta Clipper Project area are considered migratory. All migratory birds are protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703–712; 40 Stat. 755 as amended), which prohibits the take of any migratory bird without authorization from FWS. The MBTA states that “unless and except as permitted by regulations. . . it shall be unlawful at any time, by any means or in any manner, to . . . take, capture, kill, possess. . . any migratory bird, any part, nest, or eggs of any such bird. . .” In compliance with the MBTA, hunting regulations for migratory birds are developed and authorized by FWS and state fish and game departments. Waterfowl are harvested primarily in fall, although goose seasons (snow and Ross’s geese) are open in spring for some areas, in response to expanding populations of these birds that nest in arctic Canada. Some waterfowl breed in habitats that would be crossed by the pipeline, and additional Mississippi Flyway migrants cross the proposed Alberta Clipper Project area going to and from northern breeding grounds during spring and fall. Waterfowl that occur only as migrants in the Alberta Clipper Project area include snow geese, Ross’s geese, and white-fronted geese. Woodcock, snipe, and mourning doves are migratory game birds that are protected by the MBTA; as such, hunting seasons and limits are set and regulated by FWS and state fish and game departments.

In addition to the MBTA, EO 13186 (“Responsibilities of Federal Agencies to Protect Migratory Birds”) further directs executive departments and agencies to impose migratory bird conservation conventions to protect migratory birds and their habitats, including migratory waterfowl and game birds.

Non-migratory birds such as upland game birds and non-native resident or migratory birds, including the European starling, pigeon (rock dove), and English house sparrow, are not protected by the MBTA. Turkeys, prairie chickens, grouse, and bobwhites are resident native game birds; seasons and bag limits for these and for introduced game birds such as pheasants and partridges (huns) are set by state fish and game departments. Turkeys are hunted primarily during spring (bearded males only), when most harvest occurs; however, they also may be taken during fall hunts, which are usually open for any turkey. Most other resident game birds are hunted during fall.

4.6.1.4 Other Migratory Birds

Many migratory non-game birds protected by the MBTA and EO 13186 occur within habitats that would be crossed by the proposed pipeline right-of-way. Common non-game migratory birds include hawks, owls, gulls, shorebirds, jays, woodpeckers, sparrows, and songbirds.

Destruction of migratory birds or destruction of their nests that results in the loss of their eggs or young is a violation of the MBTA. A total of 94 stick nest structures were documented within 0.25 mile of the Alberta Clipper Project right-of-way during surveys conducted in March and May 2008 (GES 2008a, 2008b). These nest structures may be alternative nest sites for bald eagles or support nests of hawks or owls that may be occupied later in spring. Common hawks and owls occurring within the Alberta Clipper Project area that use stick nests include broad-winged hawk, red-tailed hawk, and great-horned owl. A great blue heron rookery and 14 osprey nest structures (primarily on transmission towers) also occur within 0.25 mile of the Alberta Clipper right-of-way (GES 2008a, 2008b). Due to the recent incorporation of the proposed crossing of the FDL Reservation, additional consultation and surveys may be necessary to determine the presence of stick nests within the boundaries of the reservation.

Breeding bird surveys in the Western Great Lakes National Forests, including CNF, indicate that an average of 7.4 birds per acre were observed at 429 sample locations during 2007 (Danz et al. 2008). Based on breeding bird survey data, other common and sometimes locally abundant non-game migratory birds occurring across the region crossed by the Alberta Clipper Project include horned lark, red-eyed vireo, cliff swallow, ovenbird, vesper sparrow, Savannah sparrow, bobolink, red-winged blackbird, western meadowlark, and brown-headed cowbird (Sauer et al. 2008).

4.6.2 Potential Impacts

The proposed Alberta Clipper pipeline primarily could affect wildlife resources by:

- Habitat loss, alteration, and fragmentation;
- Direct mortality during construction and operation;
- Loss of breeding success from exposure to construction and operational noise, and from increased human activity;
- Reduced survival or reproduction due to decreased abundance of forage species;
- Indirect mortality because of stress or avoidance of feeding due to exposure to construction and operational noise, and from increased human activity; and
- Loss of individuals and habitats due to exposure to oil releases (addressed in Section 4.13).

The Alberta Clipper pipeline right-of-way would be collocated within the existing Enbridge right-of-way along most of its route in North Dakota, Minnesota, and Wisconsin—where it crosses a variety of habitats used by wildlife, as described in Table 4.6.1-1. Construction of the Alberta Clipper pipeline would result in loss and alteration of about 6,402 acres, including more than 1,255 acres of upland forested habitats; 3,801 acres of developed, agricultural, and open habitats; and 1,346 acres of wetland habitats (including 765 acres of forested wetlands). Impacts to some areas would be short term; however, loss and alteration of forested habitats would be long term, even for those areas that would be subsequently restored in the construction right-of-way. Estimated habitat impacts by land cover categories are listed by state in Table 4.6.2-1.

TABLE 4.6.2-1 Estimated Wildlife Habitat Impacts for the Alberta Clipper Project[a]			
Habitat Classification[e]	**Construction Impacts (acres)[b, c]**	**Permanent Impacts (acres)[d]**	**Proportion of Habitat Affected During Construction (%)**
North Dakota			
Forested	1.4	0.2	0.30%
Agricultural	424.2	72.9	89.57%
Developed	1.6	0.0	0.34%
Open	17.3	2.8	3.65%
Wetland/Open Water	29.1	6.2	6.14%
North Dakota subtotal	473.6	82.1	N/A
Minnesota			
Forested	1,185.4	584.7	20.72%
Agricultural	2,101.4	495.2	36.73%
Developed	607.6	35.6	10.62%
Open	612.8	176.7	10.71%
Wetland/Open Water	1,213.7	756.6	21.22%
Minnesota subtotal	*5,720.9*	*2,048.8*	*N/A*
Wisconsin			
Forested	67.7	37.3	32.61%
Agricultural	3.2	1.3	1.54%
Developed	8.0	1.1	3.85%
Open	25.3	15.7	12.19%
Wetland/Open Water	103.4	57.9	49.81%
Wisconsin subtotal	*207.6*	*113.3*	*N/A*
Project-Wide			
Forested	1,254.5	622.2	19.60%
Agricultural	2,528.8	569.4	39.50%
Developed	617.2	36.7	9.64%
Open	655.4	195.2	10.24%
Wetland/Open Water	1,346.2	820.7	21.03%
Project total	**6,402.1**	**2,244.2**	**N/A**

TABLE 4.6.2-1 (continued)
Estimated Wildlife Habitat Impacts for the Alberta Clipper Projecta

[a] Data were derived from USGS National Land Cover Dataset, 2001 and rounded to the nearest tenth.

[b] Construction estimates include the right-of-way, extra workspace, access road, pipe and contractor yard, and pump station acreages.

[c] Construction right-of-way is based on a 140-foot-wide right-of-way, with an estimated 50 feet within the existing right-of-way and 90 feet outside of the existing right-of-way, where applicable.

[d] Permanent right-of-way is based on a 25-foot-wide right-of-way north of Clearbrook, Minnesota and a 75-foot-wide right-of-way south of Clearbrook.

[e] Forested land consists of areas classified as deciduous, evergreen, and mixed forest.
Agricultural land consists of lands used to grow crops or livestock, including pasture/hay, row crops, small grains, orchards, and vineyards.
Developed land consists of areas classified as low-intensity residential; high-intensity residential; commercial; industrial; and transportation corridors such as roads, highways, and railroads.
Open land consists of areas classified as bare rock, sand, or clay; quarries, strip mines, or gravel pits; transitional; shrubland; grasslands or herbaceous areas; and urban or recreational grasses.
Wetland/Open Water consists of areas classified as woody wetlands, emergent herbaceous wetlands, scrub/shrub wetlands, and open water.

Source: Enbridge 2007.

Wildlife habitat fragmentation issues relevant for pipeline construction and operation include:

- Barriers to movement;
- Creation of edge effects;
- Habitat disturbance;
- Reduction in patch size of remaining available habitats;
- Facilitation of predator movements;
- Intrusion of invasive species; and
- Intrusion of humans (Hinkle et al. 2002).

The proposed Alberta Clipper pipeline right-of-way would not cross any habitat areas that have been specifically set aside for wildlife conservation. However, it would cross lands containing relatively high-value wildlife habitats and resources, including the LLR and FDL Reservation, the CNF, three state forests, and two SNA/ASNRIs (Table 4.6.2-2). It also would cross the Pembina River in Pembina County, North Dakota. The Pembina River is listed in the NRI, in part for its wildlife value—including its value to a moose herd (DOI 2008, NPS 2007, FWS 2006).

Impacts to wildlife in the CNF and LLR would be identical to those described for wildlife occurring Project-wide; however, an in-depth analysis has been prepared by Enbridge, and reviewed by CNF and LLBO, for wildlife impacts within the CNF and LLR. This assessment evaluated the movements of large carnivores across maintained rights-of-way, as well as impacts to those animals from the temporary and permanent loss of habitat adjacent to the existing right-of-way, the temporary increase in noise during construction, and the temporary increase in traffic along U.S. Highway 2. For a detailed description of this assessment, see Appendix U. Similar to the LLR, impacts to wildlife within the FDL Reservation would be comparable to those occurring Project-wide.

TABLE 4.6.2-2 Important Wildlife Habitat Areas along the Alberta Clipper Project Route			
Milepost	**Name**	**Ownership**	**Miles**
Minnesota			
924.7 – 925.2	Mississippi Headwaters State Forest	Minnesota Department of Natural Resources	0.5
928.7 – 933.49	Mississippi Headwaters State Forest	Minnesota Department of Natural Resources	4.8
950.8 – 993.9	Leech Lake Reservation	Bureau of Indian Affairs	42.7
958.0 – 986.0	Bowstring State Forest	Minnesota Department of Natural Resources	28.0
988.7 – 988.8	Bowstring State Forest	Minnesota Department of Natural Resources	0.1
955.7 – 988.8	Chippewa National Forest[a]	U.S. Forest Service	33.1[b]
994.2 – 995.3	Chippewa National Forest[a]	U.S. Forest Service	1.1
1058.6 – 1071.6	Fond du Lac Reservation	Minnesota Department of Natural Resources	12.9
1059.8 – 1062.2	Fond du Lac State Forest	Minnesota Department of Natural Resources	2.5[c]
Wisconsin			
1091 – 1094.0	Pokegama Carnegie Wetlands State Natural Area/Area of Significant Natural Resource Interest	Wisconsin Department of Natural Resources	3.2
1096.0 – 1097.6	Superior Airport/Hill Avenue Wetlands/South Superior Triangle Area of Significant Natural Resource Interest	Wisconsin Department of Natural Resources	1.6

[a] The proposed Project would cross four management areas within the Chippewa National Forest, including those for unique biological aspects, general forests, general forests with longer rotation, and riparian emphasis.

[b] The area of the Chippewa National Forest crossed by the proposed pipeline is completely within the Leech Lake Reservation.

[c] The portion of the Fond du Lac State Forest crossed by the proposed pipeline is completely within the Fond du Lac Reservation.

Habitat fragmentation effects are generally reduced for pipeline rights-of-way compared to road rights-of-way because pipeline right-of-way widths are usually narrower and are usually associated with less vehicle and human disturbance (Hinkle et al. 2002). During construction, however, pipelines can be temporary barriers to wildlife movements (Hinkle et al. 2002). Additional fragmentation of undisturbed contiguous habitats from construction of the Alberta Clipper Project would be minimized by collocation of approximately 88 percent of the pipeline along the existing Enbridge right-of-way. Where the pipeline is collocated, the permanent right-of-way normally would be widened by 10 feet, north of Clearbrook, Minnesota or by 50 feet south of Clearbrook. However, there would be complete separation from existing rights-of-way for about 12 percent of the pipeline length. In many instances, these deviations are aligned

with other developed rights-of-way or are located to avoid residences or sensitive resources and would result in little additional effect on habitat fragmentation. The widened Enbridge right-of-way would, however, further reduce habitat connectivity. Most habitats crossed by the Alberta Clipper Project have been previously fragmented by pipeline rights-of-way, road and transmission line networks, and agricultural development—such that they exist as a mosaic of croplands with patches of grasslands and woodlands. A few permanent and temporary access roads would be required, but these would result in little additional habitat loss or fragmentation.

The loss of herbaceous habitats would be short term, requiring from 1 to 3 years for establishment of cover lost to workspaces and the construction right-of-way. The loss of shrub and forest habitats would be long term, requiring from 5 to more than 50 years for establishment of shrubs and trees within reclaimed areas of the construction right-of-way. Within the new permanent right-of-way, old-growth forest stands containing relatively high habitat value would be converted into herbaceous cover dominated by grasses. Additional detail on impacts to wetland habitats is provided in Section 4.4. Additionally, a minimum of 14 shelterbelts of evergreens and/or oaks would be lost. Due to the linear nature of the right-of-way, these long-term habitat losses represent a small total area of available habitat and therefore are expected to result in little impact on wildlife resources (see Tables 4.6.2-1 and 4.6.2-2).

Total habitat loss and alteration due to pipeline construction would be small in the context of available habitat around the pipeline (Table 4.6.2-1), because of the linear nature of the Alberta Clipper Project. During restoration, the right-of-way would be reseeded as directed by the landowner, such that areas of native vegetation could be converted to non-native species. Such conversion would likely reduce the value of the habitat for wildlife. Normal operation of the pipeline would result in negligible effects on wildlife. Pipeline monitoring during operation would include low-level aerial over-flight and ground-based inspections, which could cause infrequent disturbance to wildlife within and near the right-of-way. Direct impacts from maintenance activities, such as physical pipeline inspections or pipeline repair that would require digging up the pipeline, would be similar to those for construction, although the extent and duration of the impact would likely be much shorter. Additional Project-related impacts specific to groups are discussed below.

4.6.2.1 Big Game Animals

Construction of the proposed Project would affect large game animals, primarily white-tailed deer, by loss of potential foraging and cover habitats, and disturbance from areas adjacent to construction. Noise and increased human activity during construction would lead to short-term displacement and may act as a barrier to movements for some animals. After construction, maintained rights-of-way may be used as travel corridors by some big game animals and humans. Human access may be facilitated by vegetation clearing and the perception that the right-of-way is no longer private property. Increased human use could lead to increased disturbances and hunting pressure (Hinkle et al. 2002).

4.6.2.2 Small Game Animals and Furbearers

Potential impacts on small game animals and furbearers include nest or burrow destruction, abandonment or loss of young, and loss of foraging and cover habitat. A few game animals could be hit by construction vehicles, resulting in injury or death. The construction right-of-way and temporary workspaces would remain relatively clear of brush, trees, and vegetation until restoration is completed. Most small animals would avoid the cleared area, as it would provide no habitat and would create a temporary barrier to movements. Small mammals that do attempt to cross the cleared right-of-way could theoretically fall into the pipeline trench and be stranded, where they may be predated upon by coyotes, foxes, or avian predators.

Displacement of small game animals and furbearers from disturbance areas would be short term, as animals would be expected to return following completion of construction and restoration activities. Burrowing animals would be expected to return and recolonize the right-of-way after construction, although compacted areas such as temporary workspaces may become less suitable habitat. Rabbit warrens and rodent burrows would likely be destroyed during construction, if they occur within the construction right-of-way; and construction may subsequently render these areas unsuitable for burrowing animals due to compaction (Lauzon et al. 2002).

During operation, rabbits, badgers, and other burrowing rodents may theoretically be attracted by the warmth generated by the pipeline, especially during winter months. Representative soil temperature data indicate that surface temperatures would generally be about 1 to 2 degrees warmer than ambient conditions, which could have a minor impact on frost and snow in the immediate vicinity of the pipe when ambient temperatures are near freezing. Changes from surrounding soil temperature would be most noticeable during spring and would diminish into summer, when the temperature difference would decrease to the point where the ambient surface soil and pipe temperatures would be comparable.

For species that use tree and shrub habitats for cover, forage, and nesting, losses of these habitat types would be long term because the permanent right-of-way would be maintained free of trees and large shrubs. About 1,255 acres of upland forested habitats (see Table 4.6.2-1) and 765 acres of forested wetlands would be lost due to construction of the Alberta Clipper pipeline, of which about 1,117 acres (including 495 acres of forested wetlands) would be permanently maintained as herbaceous vegetation. Permanent habitat loss also would occur along shelterbelts, windbreaks, and living snow fences that intersect the permanent Alberta Clipper right-of-way. Since these features are typically narrow and occur in agricultural areas, most of these areas are not quantified as forest impacts due to the resolution of habitat mapping used to generate estimates of habitat impacts. Although the extent of impact (as acres) would be relatively low, the loss of this habitat would be most likely to affect small game and fur-bearing animals, as these tree line habitats could be used as refuge next to cropland foraging habitats (Table 4.6.1-1). Differences in vegetation cover between the right-of-way and the surrounding landscape can act as a barrier for some species, such as squirrels, while acting as a travel corridor for others, such as raccoons and coyotes. The trees and shrubs along rivers and creeks provide high-value wildlife habitat. Furbearers such as muskrats, mink, otter, weasels, and beaver use river edge habitats; and permanent removal of trees and large shrubs creates a break in cover that could increase exposure to both ground-based predators (such as fox and coyotes) and aerial predators (such as hawks and eagles).

4.6.2.3 Waterfowl and Game Birds

Most waterfowl and game birds nest on the ground, although a few notable species such as wood ducks and mourning doves nest in trees. Nests of tree- and ground-nesting birds would be lost if vegetation clearing occurred during the nesting season. Disturbance to nesting birds adjacent to the construction right-of-way could lead to nest abandonment or depredation of eggs or young. Forest-nesting birds are particularly vulnerable to habitat fragmentation effects resulting from linear construction projects. Habitat loss and fragmentation would occur until vegetation is reestablished. The revegetated habitat may also be impacted if noxious and invasive species became prevalent. The amount of habitat loss and fragmentation would be reduced by collocating approximately 88 percent of the Alberta Clipper pipeline within or adjacent to the existing Enbridge right-of-way.

For birds that use tree and shrub habitats for cover, forage, and nesting, losses of these habitats would be long term since the permanent right-of-way would be maintained free of trees and large shrubs. Migratory waterfowl may be attracted to the pipeline right-of-way during early spring if it becomes snow free before surrounding habitats. Early spring melt and early vegetation emergence near roadways and the buried portion of the Trans Alaska Pipeline in Northern Alaska attract waterfowl, shorebirds, and

ptarmigan (Trans Alaska Pipeline System Owners 2001). Animals exposed to construction noise and human disturbance may reduce foraging time and increase alert behaviors, leading to increased energy expenditure and reduced survival and reproduction.

The greater prairie chicken and sharp-tailed grouse inhabit native prairies and nest in grasslands. These species have disappeared from large portions of their historical ranges, due primarily to habitat loss or degradation resulting from agricultural practices, livestock overgrazing, and habitat succession. Breeding habitats are vulnerable to disturbance as these birds gather to breed where males display, and nesting may be concentrated within several miles of active leks. Game birds that occur in the Project area, such as prairie chickens and sharp-tailed grouse, are vulnerable to displacement by the linear projects, as well as by reductions in habitat suitability due to fragmentation.

4.6.2.4 Other Migratory Birds

Removal of trees from the construction right-of-way and extra workspaces in forested areas, riparian areas, and shelterbelts would lead to the destruction of potential raptor habitat. Losses of tree and shrub habitats used by migratory birds for cover, forage, and nesting would be long term since the permanent right-of-way would be maintained free of trees and large shrubs. If nests within trees were cut while occupied, nests, eggs, or young would be lost. Most migratory birds begin nesting in mid-April through late July; however, bald eagles may nest as early as February, and sedge wrens may nest as late as mid-September (FWS 2008a). As discussed in Enbridge's Migratory Bird Nest Avoidance and Monitoring Plan (Migratory Bird Plan,) (Appendix V), approximately 34 percent of the Alberta Clipper pipeline construction would be conducted during the nesting season, with construction activities possibly beginning in spring 2009.

Because most raptors reuse nest structures, loss of nest structures would require pairs to find new nest trees. If suitable new nest trees are not available within their established territory, new territories would need to be established. These processes would lead to increased energy demands during nesting and could lead to reduced or lost reproduction in subsequent years. Habitat fragmentation caused by changes in vegetation cover through large blocks of forest habitats within the pipeline right-of-way would have the greatest effect on raptors and migrant songbirds (Hinkle et al. 2002). Forest-nesting songbird abundance, diversity, and reproduction rates all become depressed from the fragmentation associated with linear developments (Jalkotzy et al. 1997). Linear corridors increase songbird nest predation and parasitism by fragmenting forest habitats.

4.6.3 Mitigation

To minimize potential construction and operations impacts to the environment, Enbridge has identified mitigation procedures in its state-specific EMPs (Appendix C), Revegetation and Restoration Monitoring Plans (Appendix K), and Noxious Weed Plans (Appendix H), as well as in the AMP (Appendix F) and Migratory Bird Plan (Appendix V). Many of the measures in these plans would serve to minimize impacts to wildlife and wildlife habitat. In addition, pipeline construction would be conducted in accordance with required permits.

In the above-mentioned plans, Enbridge has committed to implementing the following measures to protect wildlife, sensitive species, and their habitats:

- Slope ends on trenches to provide ramps for small mammals to escape if they were to fall into the trench.

- Minimize soil compaction through use of construction matting on susceptible soils to provide temporary support for construction equipment, and utilize tillage equipment to alleviate compaction in order to restore suitable burrowing habitat for small mammals.
- Avoid siting extra workspaces within forested areas (riparian or wetland), where possible; if unavoidable, no woody vegetation would be removed without approval from the applicable agencies.
- Reseed and reestablish areas cleared during construction (right-of-way and workspaces) to restore suitable habitat and bring back temporarily displaced wildlife.
- Minimize tree removal where windbreaks and shelterbelts would be crossed by minimizing the width of the right-of-way necessary for the trench line and vehicle traffic. Fell trees into the right-of-way to minimize damage to off-right-of-way vegetation (i.e., wildlife habitat).
- Install wildlife buffers in riparian habitats by reestablishing suitable woody species to provide cover for wildlife travel corridors in riparian areas. This includes reducing the maintained herbaceous permanent right-of-way width to 10 feet; and reestablishing woody vegetation across the new and existing permanent right-of-way, up to 50 feet from the waterbody bank, to grow up to 15 feet high.
- Maintain a 20-foot buffer of undisturbed herbaceous vegetation at all streambanks during the initial clearing and complete any instream trenching within 24 hours at minor waterbodies and within 48 hours at intermediate or major waterbodies (not including HDD crossings).
- Install jute erosion control blankets in riparian areas that are likely to contain small mammals, snakes, turtles, lizards, or other animals.
- Minimize loss to migratory bird nests by obtaining approval for clearing activities in migratory bird areas of concern beginning in March, prior to the primary nesting periods for a majority of these species.
- Conduct ground surveys within areas to be cleared of vegetation during the nesting season from May 1 to July 31 and provide appropriate protections to all active migratory bird nests identified during the survey in compliance with the MBTA.
- In the CNF, avoid active construction within a minimum of 660 feet of the known blue heron rookery from March 1 through August 31, and restrict activities within 200 feet of active black-backed woodpecker nests until young have fledged.
- Although construction of new overhead power lines are not anticipated, if new or updated overhead power lines are constructed, they would be in accordance with FWS current guidelines for preventing raptor electrocutions (FWS 2006, Enbridge 2008).
- Control off-road vehicles as requested by landowners; install No Trespassing signs at aboveground facilities, according to the provisions of Minnesota Statute 609.6055, and repair or replace all fences and gates removed or damaged during construction.

In addition to these measures, the COE has recommended measures for the LSr Pipeline Project that would minimize impacts to migratory birds, and FWS has recommended that migratory bird surveys be conducted during the nesting season for all areas that would be impacted during the nesting season. To comply with these agency recommendations and in accordance with expected permitting requirements, **we recommend that:**

- **Enbridge, in accordance with FWS requirements, finalize plans to survey for migratory bird nests during the nesting season; continue to develop measures to avoid impacts to**

migratory bird nests, such as avoidance of land clearing during the primary nesting season (May 1 through July 15 within the Project area); and continue to consult with FWS to develop compensatory mitigation for the loss of quality upland nesting habitats for migratory birds.

4.6.4 Connected Actions

The construction of five new storage tanks and a 4,600-foot facility line in Superior, Wisconsin would be necessary to store the additional product from the new Alberta Clipper pipeline; this construction would be performed under a separate permit. Because this expansion is within an area already fenced and partially developed for storage tanks, negligible loss, alteration, or fragmentation of wildlife habitats would occur—with the exception of wetland communities, which are discussed in Section 4.4. A few species of birds and small mammals may inhabit the expansion area and use habitats that would be removed to accommodate the new tanks. The total impact of the Superior Terminal Expansion Project would require 14.5 acres, including 11.3 acres of permanent impacts to non-forested wetland habitats.

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4.7 FISHERIES

This section provides information on fisheries resources in the Alberta Clipper Project area, including general fisheries resources and fish species or fisheries that are listed by state agencies, the CNF, or the LLBO as being rare, sensitive, or of special concern. Although FDL has not identified any rare or sensitive fisheries associated with crossing the FDL Reservation, consultation is continuing. Federal, state, or tribal agencies have identified significant fisheries that occur in waterbodies (e.g., streams, rivers, lakes, and ponds) at or immediately downstream of proposed crossings and have recreational or commercial value. The type of fishery present in a waterbody can be defined as coldwater, coolwater, or warmwater. Coldwater (trout and salmon), coolwater (walleye, yellow perch, and northern pike), and warmwater fisheries (Ictaluridae – catfish and bullheads, Centrarchidae – sunfish, Cyprinidae – carp, and Moronidae – temperate bass) are present in the Alberta Clipper Project area. Sensitive species information is provided in Section 4.8. Special-status species include those species listed by a state or tribe, or listed under the federal ESA as threatened, endangered, or sensitive in terms of the potential for a specific population of animals or plants to continue to exist.

4.7.1 Fisheries Resources

The fisheries section examines waterbodies that would be crossed by the proposed pipeline route that are capable of supporting fish species with recreational (important as a sport fishery) or commercial (having a market value) significance. The types of waterbodies discussed in this section include lakes; ponds; rivers; and perennial, intermittent, and seasonal streams. For the purposes of this section, the following definitions are assumed:

- "Lake" refers to any waterbody enclosed or partially enclosed where wind is the dominant mechanism in mixing (Goldman and Horne 1983).
- "Pond" refers to any enclosed or partially enclosed waterbody where convective mixing (i.e., temperature differences) predominates (Goldman and Horne 1983).
- "Perennial stream" refers to any free-flowing waterbody with a well-defined channel that contains water at all times, except in cases of extreme drought (Hewlett 1982).
- "Intermittent stream" refers to any free-flowing waterbody that does not always contain water (e.g., contains water only during wet periods approximately 30 to 90 percent of the time) (Hewlett 1982, WRRI 2002).
- "Seasonal (ephemeral) stream" refers to any waterbody that only flows during storms and may or may not have a well-defined channel (WRRI 2002).
- "Non-jurisdictional ditch/drain" refers to waterbodies that do not require a permit to cross and for which specific waterbody details, such as flow, are not available.

The Alberta Clipper Project route would involve 80 perennial waterbody crossings (including two ponds and three lakes), 82 intermittent waterbody crossings, 32 seasonal waterbody crossings, nine non-jurisdictional ditches and/or drains, and nine waterbodies pending surveys to determine flow in the states of North Dakota, Minnesota, and Wisconsin. Table 4.7.1-1 lists the perennial crossings for each state, the proposed crossing method, and the presence or absence of a fishery of special concern. A comprehensive table of all proposed waterbody crossings is provided in Appendix P. For detailed information on proposed waterbody crossing methods, refer to Section 2.4. Enbridge is currently coordinating with the COE to refine waterbody crossing methods and will need to demonstrate that each waterbody crossing method is the LEDPA in accordance with EPA's 401(b)(1) Guidelines and COE's regulations.

TABLE 4.7.1-1 Perennial Waterbodies Crossed by the Alberta Clipper Project						
Milepost	**Stream Name**	**Alberta Clipper Crossing Method[a]**	**Alberta Clipper Alternative Crossing Method[a]**	**Diluent Crossing Method[a]**	**Diluent Alternative Crossing Method[a]**	**Fisheries of Special Concern[b] Presence (Y) or Absence (N)**
NORTH DAKOTA						
Pembina County						
775.5	Pembina River[c]	HDD	DC	N/A	N/A	Y – Class III Fishery
783.3	Tongue River "cutoff"	OC	--	N/A	N/A	N
786.1	Tongue River[c]	HDD	OC	N/A	N/A	Y – Class III Fishery, recreational fishing
MINNESOTA						
Kittson County						
801.7	Red River[c, d, e]	HDD	--	N/A	N/A	Y – Class III Fishery (ND), PWI Cool/Warm Water Fishery, recreational fishing
Marshall County						
828.7	Tamarac River[d]	HDD	DC	N/A	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing
835.9	Middle River[d]	HDD	DC	N/A	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing
843.2	Snake River[d]	HDD	--	N/A	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing
847.2	South Branch of the Snake River[d]	DC	OC	N/A	N/A	Y – PWI Cool/Warm Water Fishery
Pennington County						
855.0	Judicial Ditch #25, Branch 3 (Black River)	DC	OC	N/A	N/A	N
864.3	Red Lake River[d, e]	HDD	OC	N/A	N/A	Y – PWI Cool/Warm Water Fishery, special concern for freshwater mussels, recreational fishing, lake sturgeon fish stocking

TABLE 4.7.1-1 (continued)
Perennial Waterbodies Crossed by the Alberta Clipper Project

Milepost	Stream Name	Alberta Clipper Crossing Method[a]	Alberta Clipper Alternative Crossing Method[a]	Diluent Crossing Method[a]	Diluent Alternative Crossing Method[a]	Fisheries of Special Concern[b] Presence (Y) or Absence (N)
MINNESOTA (continued)						
Red Lake County						
875.4	Clearwater River[d]	HDD	DC	N/A	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing
884.7	County Ditch #61	DC	OC	N/A	N/A	N
885.8	Lost River[d]	DC	N/A	N/A	N/A	Y – PWI Cool/Warm Water Fishery, special concern for freshwater mussels, recreational fishing
886.7	County Ditch #71	DC	OC	N/A	N/A	N
Polk County						
889.7	State Ditch #S61-L-1	DC	OC	N/A	N/A	N
890.8	Unnamed ditch to State Ditch #S61-L-1	DC	OC	N/A	N/A	N
892.4	Unnamed ditch	DC	OC	N/A	N/A	N
893.7	Unnamed ditch	DC	OC	N/A	N/A	N
893.9	Unnamed ditch	DC	OC	N/A	N/A	N
894.1	County Ditch #89	DC	OC	N/A	N/A	N
894.9	State Ditch #61 Branch 1L-1	OC	--	N/A	N/A	N
Clearwater County						
902.9	Tributary to Lost River	DC	N/A	N/A	N/A	N
904.0	Lost River[d]	DC	N/A	N/A	N/A	Y – PWI Cool/Warm Water Fishery
907.1	Silver Creek[d]	DC	N/A	N/A	N/A	Y – PWI Cool/Warm Water Fishery
907.4	Silver Creek[d]	DC	N/A	N/A	N/A	Y – PWI Cool/Warm Water Fishery
907.7	Silver Creek[d]	DC	N/A	N/A	N/A	Y – PWI Cool/Warm Water Fishery
909.1	Tributary to Silver Creek	DC	N/A	N/A	N/A	N

TABLE 4.7.1-1 (continued) Perennial Waterbodies Crossed by the Alberta Clipper Project						
Milepost	**Stream Name**	**Alberta Clipper Crossing Method[a]**	**Alberta Clipper Alternative Crossing Method[a]**	**Diluent Crossing Method[a]**	**Diluent Alternative Crossing Method[a]**	**Fisheries of Special Concern[b] Presence (Y) or Absence (N)**
MINNESOTA (continued)						
Clearwater County (continued)						
915.2	Ruffy Brook[d]	DC	N/A	GB	DC	Y – PWI Cool/Warm Water Fishery
916.6	West Four Legged Lake[d]	HDD		HDD	N/A	Y – PWI Cool/Warm Water Fishery
917.7	East Four Legged Lake[d]	OC/PP	N/A	OC/PP	N/A	Y – PWI Cool/Warm Water Fishery
Beltrami County						
922.3	Tributary to Clearwater River[f]	DC	--	DC		Y – PWI Cool/Warm Water Fishery, Minnesota-designated trout stream
922.3	Clearwater River[f]	DC	--	DC		Y – PWI Cool/Warm Water Fishery , special concern for freshwater mussels, Minnesota-designated trout stream, recreational fishing, brown and rainbow trout fish stocking
927.2	Grant Creek[d]	OC/PP	N/A	OC/PP	OC	Y – PWI Cool/Warm Water Fishery
929.8	Grant Creek[d]	DC	N/A	GB	DC	Y – PWI Cool/Warm Water Fishery
932.9	Grant Creek[d]	DC	N/A	GB	DC	Y – PWI Cool/Warm Water Fishery
933.7	Grant Creek[d]	DC	N/A	GB	DC	Y – PWI Cool/Warm Water Fishery
934.6	Drain/Tributary to Grant Creek	DC	OC	GB	DC	N
939.7	Mississippi River[d, e]	HDD	DC	HDD	DC	Y – PWI Cool/Warm Water Fishery
Hubbard County						
944.4	Tributary to the Necktie River[f]	OC	--	GB	OC	Y – PWI Cool/Warm Water Fishery, Minnesota-designated trout stream, recreational fishing

TABLE 4.7.1-1 (continued) Perennial Waterbodies Crossed by the Alberta Clipper Project						
Milepost	**Stream Name**	**Alberta Clipper Crossing Method[a]**	**Alberta Clipper Alternative Crossing Method[a]**	**Diluent Crossing Method[a]**	**Diluent Alternative Crossing Method[a]**	**Fisheries of Special Concern[b] Presence (Y) or Absence (N)**
MINNESOTA (continued)						
Hubbard County (continued)						
945.5	Tributary to the Necktie River[f]	OC	--	GB	OC	Y – PWI Cool/Warm Water Fishery, Minnesota-designated trout stream, recreational fishing
947.2	Necktie River[f]	DC	OC/PP	DC	OC/PP	Y – PWI Cool/Warm Water Fishery, Minnesota-designated trout stream, recreational fishing, brook trout fish stocking
948.5	Unnamed ditch	DC	OC	GB	DC	N
Cass County						
955.8[g]	Pike's Bay Channel[d, e]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing, walleye and northern pike spawning, potential greater redhorse
964.2[g]	Upper Sucker Lake[d]	PP	OC	GB	OC	Y – PWI Cool/Warm Water Fishery
967.8[g]	Unnamed Tributary	DC	OC	DC	OC	N
968.1[g]	Portage Creek	PP	OC	GB	PP	Y – walleye and northern pike spawning
979.4[g]	Bear Brook	PP	OC	PP	OC	N
980.9[g]	Channel	PP	OC	PP	OC	N
982.2[g]	Unnamed	DC	OC	DC	OC	N
986.0[g]	Mississippi River[d, e]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, greater redhorse
986.1[g]	Mississippi River[d, e]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, greater redhorse
986.1[g]	Mississippi River[d, e]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, greater redhorse

TABLE 4.7.1-1 (continued) Perennial Waterbodies Crossed by the Alberta Clipper Project						
Milepost	**Stream Name**	**Alberta Clipper Crossing Method[a]**	**Alberta Clipper Alternative Crossing Method[a]**	**Diluent Crossing Method[a]**	**Diluent Alternative Crossing Method[a]**	**Fisheries of Special Concern[b] Presence (Y) or Absence (N)**
MINNESOTA (continued)						
Itasca County						
989.4[g]	Ball Club River Secondary Channel[h]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing, walleye fish stocking
989.5[g]	Ball Club River Crossing[h]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing, walleye fish stocking
995.3	Deer River[h]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, recreational fishing, walleye fish stocking
1004.1	Bass Brook[h]	DC	OC	GB	DC	Y – PWI Cool/Warm Water Fishery
1010.0	Prairie River[h]	HDD	N/A	HDD	N/A	Y – PWI Cool/Warm Water Fishery, special concern for freshwater mussels
1016.1	Tributary to Mississippi River[h]	DC	OC	GB	DC	Y – PWI Cool/Warm Water Fishery
1024.2	Swan River[h]	DC	OC	GB	DC	Y – PWI Cool/Warm Water Fishery, special concern for freshwater mussels, walleye fish stocking
1024.7	Tributary to Swan River	OC/PP	--	GB	OC/PP	N
1033.9	Unnamed ditch	OC	N/A	OC	N/A	N
Aitkin County						
1035.4	Unnamed ditch	OC	N/A	OC	N/A	N
1036.2	Unnamed ditch	OC	N/A	OC	N/A	N
St. Louis County						
1038.1	Unnamed ditch	OC	N/A	OC	N/A	N
1042.9	Unnamed pond	OC	N/A	OC	N/A	N
1044.9	Tributary to Floodwood River	OC	N/A	GB	OC	N

TABLE 4.7.1-1 (continued) Perennial Waterbodies Crossed by the Alberta Clipper Project						
Milepost	**Stream Name**	**Alberta Clipper Crossing Method[a]**	**Alberta Clipper Alternative Crossing Method[a]**	**Diluent Crossing Method[a]**	**Diluent Alternative Crossing Method[a]**	**Fisheries of Special Concern[b] Presence (Y) or Absence (N)**
MINNESOTA (continued)						
St. Louis County (continued)						
1045.0	Tributary to Floodwood River[h]	OC	N/A	GB	OC	Y – PWI Cool/Warm Water Fishery
1046.0	Savanna River[h]	DC	OC	DC	OC	Y – PWI Cool/Warm Water Fishery, recreational fishing
1050.1	Tributary to St. Louis River[h]	DC	OC	GB	DC	Y – PWI Cool/Warm Water Fishery
1052.0	Tributary to St. Louis River[h]	DC	OC	GB	DC	Y – PWI Cool/Warm Water Fishery, recreational fishing, walleye fish stocking
1052.7	Ahmik River (Mirbat Creek)[h]	DC	OC	GB	DC	Y – PWI Cool/Warm Water Fishery
1058.6[i]	Tributary to Dead Fish Lake	OC/PP	N/A	OC/PP	NA	N
Carlton County						
1062.5[i]	Stoney Brook	DC	OC	DC	OC	N
1064.3[i]	Tributary to Dead Fish Lake	DC	OC	DC	OC	N
1064.8[i]	Tributary to Rice Portage Lake	OC/PP	N/A	OC	OC/PP	N
1071.2[i]	Tributary to Little Otter Creek	OC/PP	N/A	OC	N/A	N
1071.5[i]	Tributary to Little Otter Creek[h]	DC	OC	GB	OC	Y – PWI Cool/Warm Water Fishery
1072.9[i]	Unnamed Pond	OC/PP	N/A	OC/PP	N/A	N
1074.3	Little Otter Creek[j]	DC	OC	DC	OC	Y – PWI Cool/Warm Water Fishery, Minnesota-designated trout stream

TABLE 4.7.1-1 (continued) Perennial Waterbodies Crossed by the Alberta Clipper Project						
Milepost	**Stream Name**	**Alberta Clipper Crossing Method[a]**	**Alberta Clipper Alternative Crossing Method[a]**	**Diluent Crossing Method[a]**	**Diluent Alternative Crossing Method[a]**	**Fisheries of Special Concern[b] Presence (Y) or Absence (N)**
WISCONSIN						
Douglas County						
1094.4	Pokegama River[k]	DC	OC	DC	OC	Y – Recreational fishing

[a] DC = –Dry crossing (dam-and-pump or flume) waterbodies that are dry or have no perceptible flow at the time of crossing will be crossed using the open-cut/wet trench method. The actual crossing method will be determined at the time of crossing based on site conditions, HDD = Horizontal directional drill, OC = Open-cut (similar to dry crossings, waterbodies that are proposed for open-cut but have perceptible flow at the time of crossing will be crossed via a dry crossing method), OC/PP = Open-cut, push-pull, PP = Push-pull, GB = Guided bore, N/A = Not applicable.

[b] PWI = Minnesota Public Waters Inventory.

[c] HDD or no in-channel work from April 15 to June 1.

[d] No in-channel work from March 15 to June 15.

[e] RHA Section 10 permit required.

[f] No in-channel work from September 1 to April 15

[g] Waterbody is within the Leech Lake Reservation/Chippewa National Forest.

[h] No in-channel work from April 1 to June 30.

[i] Waterbody is within FDL Reservation.

[j] No in-channel work from September 15 to June 30.

[k] No in-channel work from April 1 to June 1.

Source: Enbridge 2009.

Table 4.7.1-2 provides the major recreational and commercial fish species located in the perennial streams and rivers along the Alberta Clipper Project route. While the species listed in Table 4.7.1-2 are not the only fish inhabiting those waterbodies, they are the ones designated as having recreational or commercial value. These fisheries are discussed in more detail in Section 4.7.2.

4.7.2 Fisheries of Concern

This section addresses fisheries of special concern found in perennial streams (including rivers), ponds, and lakes that would be directly crossed by the pipeline route. Although intermittent waterbodies may be of substantial value in terms of fisheries resources, they are not addressed in this section because information is not available for these waterbodies and fisheries impacts are expected to be minimal because they do not typically contain water year-round.

Fisheries management in each state incorporates the respective surface water classification systems. The classifications are based on a waterbody's water quality and resource value and are intended to create an estimate of the potential use.

TABLE 4.7.1-2
Recreational and Commercial Species in Perennial Waterbodies Crossed by the Alberta Clipper Project

Common Name	Scientific Name	Alberta Clipper Project Occurrence		
		ND[a]	MN[b]	WI[c]
Alewife	*Alosa pseudoharengus*			X
Bigmouth buffalo	*Ictiobus cyprinellus*	X	X	
Black bullhead	*Ameiurus melas*	X	X	X
Black crappie	*Pomoxis nigromaculatus*	X	X	X
Bluegill	*Lepomis macrochirus*	X	X	X
Brook trout	*Salvelinus fontinalis*		X	
Brown bullhead	*Ameiurus nebulosus*	X	X	X
Brown trout	*Salmo trutta trutta*	X	X	
Burbot	*Lota lota*	X	X	X
Channel catfish	*Ictalurus punctatus*	X	X	X
Chinook salmon	*Oncorhynchus tshawytscha*	X	X	X
Cisco herring	*Coregonus artedii*	X	X	X
Coho salmon	*Oncorhynchus kisutch*		X	X
Common carp	*Cyprinus carpio carpio*	X	X	
Flathead catfish	*Pylodictis olivaris*		X	
Freshwater drum	*Aplodinotus grunniens*	X	X	
Lake herring	*Coregonus artedi*		X	X
Lake trout	*Salvelinus namaycush*	X	X	X
Lake sturgeon	*Acipenser fulvescens*	X	X	X
Lake whitefish	*Coregonus clupeaformis*	X		X
Largemouth bass	*Micropterus salmoides*	X	X	X
Muskellunge	*Esox masquinongy*	X	X	X
Northern pike	*Esox lucius*	X	X	X
Paddlefish	*Polyodon spathula*	X		
Rainbow trout	*Oncorhynchus mykiss*	X	X	X
Round whitefish	*Prosopium cylindraceum*			X
Sauger	*Sander canadensis*	X	X	

TABLE 4.7.1-2 (continued)
Recreational and Commercial Species in Perennial Waterbodies Crossed by the Alberta Clipper Project

Common Name	Scientific Name	Alberta Clipper Project Occurrence		
		ND[a]	MN[b]	WI[c]
Smallmouth bass	*Micropterus dolomieu*	X	X	X
Tiger trout	*Plectropomus laevis*		X	
Walleye	*Sander vitreus*	X	X	X
White bass	*Morone chrysops*	X		X
White crappie	*Pomoxis annularis*	X	X	
White perch	*Morone americana*	X		X
White sucker	*Remorina albescens*	X	X	X
Yellow bullhead	*Ameiurus natalis*		X	X
Yellow perch	*Perca flavescens*	X	X	X

[a] Source: NDGFD 2008a.
[b] Source: MDNR 2008a.
[c] Source: WDNR 2008.

North Dakota

Three perennial stream crossings (and an additional perennial stream on the state border), six intermittent streams, 15 seasonal streams, and three non-jurisdictional ditches and/or drains occur in North Dakota along the proposed Alberta Clipper Project route (Table 4.7.1-1 and Appendix P). Three perennial streams that would be crossed in North Dakota (the Pembina River, Tongue River, and the Red River [on the border of North Dakota and Minnesota]) have been recommended for HDD crossing by North Dakota Game and Fish Department (NDGFD), FWS, NRCS, or EPA due to forested riparian habitat (the Tongue River) and high-value fisheries (the Pembina and Tongue Rivers are considered Class III fisheries, and the Red River is considered a Class I fishery). Enbridge proposes to cross each of these perennial waterbodies via HDD in accordance with agency recommendations (Table 4.7.1-1).

Common fish species include pike, catfish, walleye, perch, and white sucker (Table 4.7.1-2). NDGFD stocking reports did not report any recent stocking efforts within the three perennial streams crossed by the proposed Project (NDGFD 2008b). Information on fish populations in the numerous small ditches crossed by the proposed route in North Dakota is not available; however, it is possible that they could support recreational fisheries and may be headwater streams to larger waterbodies.

Minnesota

Seventy-one perennial stream crossings, two perennial pond crossing, three lake crossings, 15 unsurveyed waterbodies, 65 intermittent streams, 15 seasonal streams, and six non-jurisdictional ditches and/or drains occur in Minnesota along the proposed Alberta Clipper Project route (Table 4.7.1-1 and Appendix P). According to MDNR, the creek heelsplitter (*Lasmigona compressa*), black sandshell (*Ligumia recta*), and fluted shell (*Lasmigona costata*) mussels—all special concern species—have been documented in the vicinity of the proposed Red Lake River, Lost River (the Red Lake County crossing at MP 885.8), Clearwater River (the Beltrami County crossing at MP 922.3), Prairie River, and Swan River crossings. MDNR has recommended that each of these rivers be crossed via HDD. In addition, EPA has recommended that the Swan River and Lost River be crossed via HDD.

Enbridge has conducted mussel surveys within each of these waterbodies to assess the presence of special-status mussels near the proposed crossing locations. Although other species were occasionally found during the surveys, live individuals of special-status species were found only in the Red Lake River (36 individuals), Lost River (two individuals), and Swan River (one individual); one shell was found in the Prairie River; and none were found in the Clearwater River. Enbridge proposes to cross the Red Lake River and Prairie River via HDD based on the presence of mussel species and contamination, respectively. They propose to use a dry crossing (dam-and-pump or flume method) to cross the Lost River, the Clearwater River (previous attempts at an HDD crossing have failed at this location due to the existence of subsurface glacial erratics), and the Swan River. To minimize impacts to mussels in the Swan River, we have recommended in Section 4.8 that Enbridge relocate the mussels prior to instream work. Enbridge relocated mussels in the Lost River prior to work for the LSr pipeline. Although not all crossing methods proposed are in direct accordance with the recommendations of MDNR and EPA, the dry crossing method proposed for each of these waterbodies would limit impacts relative to the wet crossing methods that were approved for these waterbodies for the LSr pipeline, which would be in the same general right-of-way as the proposed Project. The exception is the Swan River, which is not located along the LSr pipeline route. The COE will ultimately determine the final LEDPA crossing methods for the Swan River. Additional information regarding threatened and endangered species and species of special concern is provided in Section 4.8.

In Minnesota, the proposed Project would cross five designated trout streams: Tributary to the Clearwater River, Clearwater River (Beltrami County crossing at MP 922.3), Tributary to the Necktie River (two

crossings), Necktie River, and Little Otter Creek (Table 4.7.1-1). Crossing methods were proposed by Enbridge in consideration of waterbody characteristics, including streambank slope, width, and the presence or absence of sensitive resources (see Section 4.7.3). In consideration of site-specific concerns, Enbridge proposes to cross the tributary to the Clearwater River, the Clearwater River, the Necktie River, and Little Otter Creek via a dry crossing method (dam-and-pump or flume). Previous HDD attempts at the Clearwater River at this location were unsuccessful, and the crossing was ultimately open cut. Enbridge proposes to cross the tributary to the Necktie River (both crossings) via open-cut methods. MDNR has recommended that no instream work in designated trout streams be conducted between September 1 and April 15 for waterbodies west of Itasca County and from September 15 to April 30 for waterbodies from Itasca County east of the Minnesota/Wisconsin border to avoid impacts. Based on ongoing consultations with the COE, Enbridge would avoid instream construction (including hydrostatic testing) activities in Little Otter Creek from September 15 through April 30, in accordance with state fisheries restrictions.

The COE requested that the Savanna River be crossed via HDD. According to Enbridge, due to the limitations of the HDD method and the change in pipeline alignment near the Savanna River crossing, HDD would not be possible.

Common fish species for the Minnesota waterbody crossings include walleye, sauger, bass, and muskellunge. Based on MDNR's 2006 stocking report, nine perennial streams that would be crossed by the proposed Project were stocked in 2006 with various species such as lake sturgeon, brown trout, rainbow trout, brook trout, and walleye (Table 4.7.1-1) (MDNR 2006). Information on fish populations in the numerous small ditches crossed by the proposed route is not available; however, they are considered waters of the state, could support recreational fisheries, and may be headwater streams to larger waterbodies.

In general, impacts to fisheries crossed within the CNF and the LLR would be identical to those described for fisheries crossed Project-wide (as discussed in Section 4.7.3); however, an in-depth analysis has been prepared by the Applicant, and reviewed by CNF and LLBO, for impacts to fisheries within the CNF and LLR (see Appendix U). This assessment discusses impacts to fisheries from removal of stream vegetation and cover, as well as from increased turbidity and sedimentation from construction. The proposed Alberta Clipper pipeline would cross 17 waterbodies (10 perennial, one seasonal, three intermittent, and three pending surveys) within the CNF/LLR (Table 4.7.1-1). Enbridge proposes to cross four waterbodies via HDD, four via dry crossing methods (dam-and-pump or flume), one via road bore, and five via push-pull. Three waterbodies are pending surveys, and crossing methods are not proposed at this time.

The proposed Alberta Clipper pipeline would cross nine waterbodies (seven perennial and two pending surveys) within the FDL Reservation (Table 4.7.1-1). Enbridge proposes to cross three via dry crossing methods (dam-and-pump or flume) and four via open-cut/push-pull methods. Two waterbodies are pending surveys, and crossing methods are not proposed at this time.

Wisconsin

One perennial stream crossing, 11 intermittent stream crossings, and two seasonal waterbody crossings occur in Wisconsin along the proposed Alberta Clipper Project route (Table 4.7.1-1 and Appendix P).

Common fish species include walleye, northern pike, suckers, and burbot (Table 4.7.1-2). Stocking reports from the Wisconsin Bureau of Fisheries Management did not identify any recent stocking efforts within the perennial stream (Pokegama River) crossed in Wisconsin by the proposed Project within the

past 35 years (WBFM 2008). Information on fish populations in the numerous small ditches crossed by the proposed route is not available, but they could support recreational fisheries.

4.7.3 Potential Impacts

Potential impacts from the proposed Project include construction-related impacts and impacts associated with operation and maintenance of the pipeline and right-of-way. The Alberta Clipper Project primarily could affect fisheries resources by:

- Instream and streambank habitat loss and alteration;
- Increased sedimentation and turbidity;
- Loss of spawning or rearing success from construction and operations noise and human activity;
- Direct mortality from construction and operations;
- Adverse health effects caused by decreased water quality due to construction;
- Indirect mortality because of stress or avoidance of feeding due to exposure to construction and operations noise, and from increased human activity;
- Loss of individuals and habitats due to water appropriations for hydrostatic testing; and
- Loss of individuals and habitats due to exposure to toxic materials from equipment spills or refueling operations, or accidental crude oil releases (addressed in Section 4.13).

4.7.3.1 Waterbody Crossing Methods

The degree of construction-related impacts would depend on the crossing method, existing conditions at each crossing, the duration of instream activity, and mitigation measures implemented. In addition, Enbridge is coordinating with the COE to refine waterbody crossing methods and will need to demonstrate to the COE that each waterbody crossing method is the LEDPA in accordance with EPA's 401(b)(1) Guidelines and COE's regulations. Enbridge proposes six crossing techniques for waterbodies, depending on stream size, sensitive features, and protection status and classification of the waterbody (see Section 2.4 for construction method details). Enbridge proposes to cross waterbodies along the Alberta Clipper pipeline using one of the following six techniques:

- Open cut (also known as wet trench);
- Open cut/push-pull;
- Push-pull;
- Dry crossing (dam-and-pump or flume);
- Road bore; and
- Horizontal directional drill (HDD).

Enbridge proposes to cross most waterbodies, including designated coldwater fisheries, using a dry crossing method (dam-and-pump, flume, or HDD) where feasible. The proposed crossing methods for the perennial stream crossings can be found in Table 4.7.1-1, and a comprehensive list of all crossing methods can be found in Appendix P. At this time, 15 waterbodies are pending survey information which would be used to determine the proposed crossing method.

BMPs would be implemented to avoid and minimize potential impacts associated with crossing methods. BMPs are accepted procedures that contractors would follow during construction. Some examples include the use of silt fence or straw as sediment runoff barriers and the use of construction mats to minimize ground pressure and soil compaction. Enbridge's state-specific EMPs (Appendix C) describe the BMPs that would be used for each type of waterbody crossing to reduce potential effects on fish and aquatic/streambank habitat. As described below, there would most likely be minor impact to the habitat and aquatic organisms if the proposed mitigation procedures discussed below and in Section 4.7.4 are followed for the crossings.

Open Cut (Wet Trench) Method

The open-cut method involves trenching through the waterbody while the water continues to flow through the construction work area (see Section 2.4 for construction method details). Enbridge proposes to cross 33 waterbodies via the open-cut method.

Enbridge proposes to modify the proposed crossing method based on flow conditions at the time of construction. Enbridge proposes to use the open-cut method on waterbodies planned as a dry crossing, if the waterbody is dry or has no perceptible flow at the time of construction. Conversely, Enbridge proposes to use a dry crossing method for waterbodies that were proposed as an open cut if there was perceptible flow at the time of construction. According to Enbridge, the appropriate regulatory agencies would be contacted to discuss any change in crossing method.

Open-cut and some dry crossing methods, such as dam-and-pump or flume methods, would result in disturbance of the stream channel and streambanks, although the relative magnitude and duration of those impacts would vary among the crossing methods.

The open-cut method has the greatest potential for short-term impacts to the aquatic resources present in the area. These impacts generally would be limited to brief periods of instream construction. An advantage of the open-cut method is that, in most circumstances, the length of time that in-channel disturbance occurs is less than for other methods. Depending on the width of the stream, minor waterbodies (less than 10 feet wide) would generally be crossed in less than 24 hours, and intermediate (10 to 99 feet wide) and major (100 feet wide or greater) waterbodies would be crossed in less than 48 hours, not including those crossed by HDD.

A potential effect from open-cut techniques is an increase in sedimentation in the waterbody caused by trenching, backfilling, and streambank erosion. The extent of sedimentation would partially depend on the nature of the substrate encountered during trenching and backfilling. Increases in instream sediment levels can alter a stream's substrate composition and fill inter-gravel spaces and pool habitats. They also can degrade the existing aquatic habitat by reducing spawning habitat, available rearing habitat, and benthic invertebrate production.

Fish populations can be directly affected by suffocation of eggs and newly hatched larvae living in gravels, and by abrasion of the sensitive gill membranes of both young and adult fish (Cordone and Kelley 1961, Chutter 1969, Sutherland 2007). Fine sediments can reduce the productivity of benthic invertebrates, which would reduce forage available to insectivorous fish. Many fish rely on vision for locating prey, and high concentrations of suspended sediments can negatively impact feeding behavior (Chutter 1969, Barrett et al. 1992). Due to the limited nature and duration of impacts at the site of waterbody crossings, the relatively short timeframe in which suspended sediments would be expected to settle, and Enbridge's commitment to using open-cut crossing methods only in instances of low flow, it is expected that impacts downstream of the proposed Project would be minor or nonexistent.

Construction of the pipeline also would require clearing vegetation from the construction right-of-way. One of the adverse potential aquatic impacts related to removal of riparian cover is the direct loss of the bank features that are utilized by fish for cover, nesting, and feeding. An indirect effect would be the loss of larger structures (trees, boulders, and woody debris) that could ultimately fall into the waterbody and create cover, as well as enhance the habitat complexity by creating pools and gravel bars (Angermeier and Karr 1984, Abbe and Montgomery 1998). Removal of vegetation could also destabilize the banks and increase the potential for additional erosion, resulting in sedimentation and turbidity in the waterbody (Tabacchi et al. 1998).

Enbridge does not anticipate that blasting would be required on the Alberta Clipper Project.

During construction activities, there is also the potential for spills of fuel or other hazardous liquids. Spills can occur during refueling and lubricating of construction equipment and from leaks from storage containers or equipment working in or near streams. Generally, any actions involving the use of hazardous materials would be restricted to areas at least 100 feet from the active channel. For a more detailed examination of the effects and mitigation measures for spills, refer to Section 4.13 and the SPCC Plan (Appendix E).

Soil temperatures surrounding oil and gas pipelines are influenced by soil and climatic properties (Modissette 2007). For all waterbody crossings, the pipeline would be installed with a minimum cover of 48 inches from the bottom of the waterbody. The combination of this depth and the flowing nature of the waterbody would be expected to result in minimal effects to water temperature from the temperature of the pipeline.

During operation of the pipeline, vegetation would be maintained along the right-of-way. The reduction of large vegetative cover (i.e., trees) in the permanent right-of-way could result in a permanent loss of shading, nutrients, and habitat enrichment features for fish at some waterbody crossings. The streambank is also more susceptible to erosion without the stability provided by larger vegetation species. Enbridge has proposed that vegetation maintenance and control be accomplished through mechanical methods first, followed by chemical control methods (i.e. pesticides and herbicides). The use of pesticides near a waterbody can potentially affect the aquatic organisms. This can occur through runoff, seepage through the soils, and direct placement during the control operations. In addition, NDDH and WDNR prohibit the use of pesticides and herbicides near waterbodies, and FDL prohibits the use of herbicides within the boundaries of the reservation. Enbridge has developed Noxious Weed Plans that outline methods to prevent and reduce the introduction and spread of noxious weeds and invasive species, and includes BMPs for herbicide applications (Appendix H). For more information on vegetation control impacts and mitigation, refer to Section 4.5. For additional mitigation measures to minimize the potential impacts of open-cut methods on fisheries, see Section 4.7.4.

Open-Cut/Push-Pull Method

The open-cut/push-pull method is similar to an open-cut crossing. The push-pull technique involves stringing and welding the pipeline from the streambank, and excavating and backfilling the trench using a backhoe or dragline. The prefabricated pipeline is installed in the waterbody by equipping it with buoys and pushing or pulling it across the water-filled trench. After the pipeline is floated into place, the floats are removed and the pipeline sinks into place.

Enbridge proposes to cross eight waterbodies via the open-cut/push-pull method. This method would be used for waterbodies with adjacent wetlands to reduce the potential impacts of vehicle traffic and access.

Potential construction impacts of the open-cut/push-pull method would be similar to those described in Section 4.7.3.1 for the open-cut method. However, the magnitude of impacts would be less due to the reduction of construction activity in the wetted channel. Potential effects associated with this method of construction include increased sedimentation and direct mortality caused by construction equipment in the stream.

Potential operation and maintenance impacts would be similar to those described in Section 4.7.3.1 for the open-cut method. Potential impacts could result from vegetation control, increased temperatures from vegetation removal, and introduction of exotic or invasive species of animals and plants.

Push-Pull Method

Enbridge proposes to cross five waterbodies via the push-pull method. According to Enbridge, the five waterbodies that would be crossed via this method have associated wetlands that would use a push-pull crossing method within the associated wetlands. However, use of the push-pull method within the waterbody would be identical to the open-cut/push-pull method described above.

Potential construction, operation, and maintenance impacts would be similar to those described for the open-cut/push-pull method.

Dry Crossing Methods

Enbridge proposes to cross 130 waterbodies via dry crossing methods (dam-and-pump or flume). As stated earlier, Enbridge proposes to modify the proposed crossing method based on flow conditions at the time of construction. Therefore, waterbodies proposed as a dry crossing, if dry at the time of construction, would be open cut. Likewise, Enbridge proposes to use a dry crossing method for waterbodies that were proposed as an open cut if there was perceptible flow at the time of construction. According to Enbridge, the appropriate regulatory agencies would be contacted to discuss any change in crossing method.

Dam-and-Pump Method

The dam-and-pump method is a dry crossing method used for sensitive waterbodies with low gradients and flow, or sensitive waterbodies with meandering channels. This method involves constructing temporary dams across the waterbody, both upstream and downstream of the crossing locations, prior to excavation. Dams generally would be installed using sandbags, plastic sheeting, or steel bulkheads. Pumps and piping would be used to transport the streamflow around the construction area. This method has been designated for use at environmentally sensitive waterbodies where technically feasible, since it results in less sedimentation and turbidity than the open-cut method.

Potential construction impacts would be similar to those described in Section 4.7.3.1 (open cut), although the magnitude and duration of turbidity and sedimentation would be reduced. Potential effects associated with this method of construction include sedimentation and direct mortality due to construction equipment in the stream.

Potential operation and maintenance impacts would be similar to those described in Section 4.7.3.1 (open cut). Potential impacts could result from vegetation control, increased temperatures from vegetation removal, oil spills, and introduction of exotic or invasive species of animals and/or plants.

Impacts to the Lost River (MP 885.5) would be minimized by using a dry crossing method (dam-and-pump or flume), and special-status mussels in the waterbody were relocated for a previous project. To

further minimize impacts to this waterbody, and in accordance with expected COE permitting requirements, **we recommend that:**

- **Enbridge develop a Construction Mitigation Plan (CMP) for the Lost River—for approval by the COE at least 1 week prior to construction—that includes confirmation of the crossing method, site-specific mitigation to minimize impacts, a list of all sediment and erosion control equipment that would be on-site, and an endangered resource plan, or as otherwise directed by the COE for the Alberta Clipper Project.**

Flume Method

The flume method is a dry crossing method used for sensitive, relatively narrow waterbodies free of large rocks and bedrock at the trenchline and with a relatively straight channel (as opposed to the dam-and-pump method which may be used in waterbodies with a meandering channel) across the construction right-of-way. The flume method generally is not appropriate for wide, deep, or heavily flowing waterbodies. Use of this method involves installing dams upstream and downstream of the construction area and installing one or more pipes (flumes) that would extend along the course of the waterbody and through both dams. Streamflow would be carried through the construction area by the flume pipes. As with dam-and-pump construction methods, the benefit of the flume method results from the decrease in turbidity and sedimentation that occurs during open-cut crossings.

Potential construction impacts would be similar to those described in Section 4.7.3.1 for the dam-and-pump method. Potential effects associated with this method of construction include increased sedimentation and direct mortality due to construction equipment in the stream.

Potential operation and maintenance impacts would be similar to those described in Section 4.7.3.1 for the dam-and-pump method.

Road Bore

Enbridge proposes to cross five waterbodies via road bore method. Enbridge would use road-boring equipment to bore a tunnel under the waterbody. This method involves digging a pit on each side of the waterbody. Boring equipment would be placed in one of the pits, and the tunnel would be bored to the other pit. When the tunnel is completed, a prefabricated segment of pipe would be pulled through the tunnel and welded to the adjoining sections of pipe.

The benefits of a road bore crossing occur from the ability to cross under a stream channel, thereby avoiding alteration or removal of aquatic habitat and impacts to the fishery resources within the waterbody. The benefit is similar to that of the HDD method discussed below; however, the road bore method is a more feasible option for relatively short crossings of shallow channels. According to Enbridge, the road bore crossing method has limitations. The road bore method requires excavation pits on both sides of the road or waterbody to be crossed. Typically the road bore method is used when crossing roads since the average elevation of the feature is typically higher than the adjacent mainline ditch. Therefore, this technique has limited use at waterbody and wetland crossings where the average elevation of the feature is typically less than the pipeline trench.

Operational impacts on active stream channels where road bore installation method is used would be negligible.

Horizontal Directional Drill

The HDD crossing method would be utilized for certain major and sensitive waterbodies. This method involves drilling a pilot hole under the stream channel and banks through which the pipe sections would be pulled through. Enbridge has committed to using HDD at 22 crossings along the Alberta Clipper Project route (Appendix P).

As with bore methods, HDD crossings would not typically alter or remove aquatic habitat and would not likely affect fisheries during construction or operation. The use of this procedure is limited due to the need for suitable substrate conditions and the increase in space requirements, time, cost, and materials needed. HDD crossings could require weeks or months to complete. HDD crossings for selected major and sensitive waterbodies would be constructed in accordance with a site-specific construction and mitigation plan produced by Enbridge that would be approved prior to construction by the COE, with input from relevant federal and state resource agencies. The use of HDD does carry a risk of the escape of drilling fluids (frac-out) into rivers at the crossings, which could result in short-term sediment transport and water quality impacts that could adversely affect fish (see Section 4.3.2.2).

According to Enbridge, all HDD locations could use drilling mud additives such as Rod Ease, Max Gel, Poly-Plus, DrillPlex HDD, Ringfree, or their equivalent. MPCA requested toxicity information on the proposed drilling additives, and Enbridge provided Material Safety Data Sheets and toxicity test results. Toxicity test results for the proposed drilling mud additives can be found in Table 4.7.3-1. Several types of toxicity tests were examined based on whether the impact was lethal or sublethal. LC50 (lethal concentration) tests define the amount of toxicant required to kill 50 percent of the organisms tested. ED50 (effective dose) and EC50 (effective concentration) tests statistically estimate the dosage required to kill 50 percent of the organisms tested. IC50 (inhibition concentration) tests define the amount of toxicant required to inhibit the biological function of 50 percent of the test organisms. In the event of a release of drilling mud, the concentrations of the additives would be relatively low; therefore, impacts on aquatic species would be expected to be minimal.

Enbridge stated that, in the event that the contractor wishes to use a drilling mud additive that is not on Enbridge's current list, Enbridge would provide the MPCA and/or MDNR with requested information such as Material Safety Data Sheets, toxicity testing results, and preferred concentrations for the new additive(s). Enbridge stated that drilling mud additive concentrations would be determined based on field conditions and manufacturer's recommendations for the chosen product.

Enbridge has prepared a Drilling Mud Containment, Response, and Notification Plan that identifies procedures to address the inadvertent release of drilling mud during HDD operations (Appendix G). If a release is observed, these procedures would be implemented to minimize the potential for drilling mud to impact wetlands, waterbodies, or surface soils adjacent to these features. The plan includes the following: specific response actions when releases occur in wetlands, waterbodies, and/or upland areas; containment, cleanup, and notification procedures; and steps to be taken to restore affected areas. The plan also lists the containment, response, and cleanup equipment that would be in place on each side of an HDD crossing. Containment and cleanup equipment would be kept onsite for each HDD crossing for a timely response in the event of a release.

Operational impacts on streambanks and stream channels where the HDD installation method is employed would be negligible.

TABLE 4.7.3-1 Toxicity Tests for Potential Drilling Mud Additives for the Alberta Clipper Project					
	Drilling Mud Additives				
	Rod Ease	Max Gel	Poly-Plus	DrillPlex HDD	Ringfree
48-Hour LC50/ED50 Toxicity Tests					
Daphnia pulex (water flea)	>1,000 mg/L	ND		>9,500 mg/L	
Chaetogrammus marinus (Daphnia)			>15 mg/L		
Daphnia magna (water flea)					>100 mg/L*
Danio rerio (zebrafish)					> 100 mg/L*
72-Hour EC50/IC50 Toxicity Tests					
Phaeodoctylum tricoumumtum (algae)			>1,000 mg/L**		
Scenedesmus subspicatus (algae)					>100 mg/L***
96-Hour LC50 Toxicity Tests					
Pimephales promelas (fathead minnow)	>1,000 mg/L	>10,000 mg/L	>1,000 mg/L	1,653 mg/L	
Recommended Concentrations					
	1 to 2% of fluid volume or 1 to 2 pints per 100 gallons of drilling fluid	6 to 50 kg/m^3	2.1 to 8.5 kg/m^3	6 lbs (2.7 kg) per 300 gallons (1,136 L) of drilling fluid	0.5 - 1.5 gallons (1.9 – 5.7 L) per 300 gallons (1.135 L) of fluid

kg/m^3 = Kilograms per cubic meter.
L = Liter.
mg/L = Milligrams per liter.
ND = Not determined.
* = Effective Dose 50 (ED50).
** = Effective Concentration 50 (EC50).
*** = Inhibition Concentration 50 (IC50) all others Lethal Concentration 50 (LC50).

Source: Enbridge 2008.

4.7.3.2 Hydrostatic Testing

Withdrawal and discharge of water for hydrostatic testing can affect fisheries (Manny 1984). Enbridge proposes 15 waterbodies on the Alberta Clipper Project route as potential sources for hydrostatic testing (Table 4.7.3-2). Among the list of proposed water sources, all 15 locations are known to contain sensitive species.

TABLE 4.7.3-2
Hydrostatic Testing Water Source Locations for the Alberta Clipper Project

Milepost	State	County	Water Source	Discharge Location[a]	Alberta Clipper Estimated Volume (million gallons)	Diluent Estimated Volume (million gallons	Test Type[b]	Test Section	Timing Window Restriction
775.5	ND	Pembina	Pembina River	Pembina River	0.10	N/A	HDD	-	No in-channel work from April 15 through June 1
786.1	ND	Pembina	Tongue River	Tongue River	0.07	N/A	HDD	-	No in-channel work from April 15 through June 1
795.2	ND	-	TBD	TBD	0.06	N/A	HDD	-	TBD
801.7	ND/MN	Pembina/ Kittson	Red River	Red River	7.25	N/A	Pipeline	1	No in-channel work from April 15 through June 1 (ND) No in-channel work from March 15 through June 15 (MN)
801.7	ND/MN	Pembina/ Kittson	Red River	Red River	7.55	N/A	Pipeline	2	No in-channel work from April 15 through June 1 (ND) No in-channel work from March 15 through June 15 (MN)
801.7	ND/MN	Pembina/ Kittson	Red River	Red River	0.14	N/A	HDD	-	No in-channel work from April 15 through June 1 (ND) No in-channel work from March 15 through June 15 (MN)

TABLE 4.7.3-2 (continued)
Hydrostatic Testing Water Source Locations for the Alberta Clipper Project

Milepost	State	County	Water Source	Discharge Location[a]	Alberta Clipper Estimated Volume (million gallons)	Diluent Estimated Volume (million gallons	Test Type[b]	Test Section	Timing Window Restriction
817	MN	_	TBD	TBD	0.07	N/A	HDD	-	TBD
828.7	MN	Marshall	Tamarac River	Tamarac River	0.07	N/A	HDD	-	No in-channel work from March 15 through June 15
835.9	MN	Marshall	Middle River	Middle River	0.08	N/A	HDD	-	No in-channel work from March 15 through June 15
843.1	MN	_	TBD	TBD	0.07	N/A	HDD	-	TBD
864.3	MN	Pennington	Red Lake River	Red Lake River	9.28	N/A	Pipeline	3	No in-channel work from March 15 through June 15
864.3	MN	Pennington	Red Lake River	Red Lake River	2.97	N/A	Pipeline	4	No in-channel work from March 15 through June 15
864.3	MN	Pennington	Red Lake River	Red Lake River	0.13	N/A	HDD	-	No in-channel work from March 15 through June 15
875.4	MN	Red Lake	Clearwater River	Clearwater River	9.00	N/A	Pipeline	5	No in-channel work from March 15 through June 15
875.4	MN	Red Lake	Clearwater River	Clearwater River	0.12	N/A	HDD	-	No in-channel work from March 15 through June 15

TABLE 4.7.3-2 (continued)
Hydrostatic Testing Water Source Locations for the Alberta Clipper Project

Milepost	State	County	Water Source	Discharge Location[a]	Alberta Clipper Estimated Volume (million gallons)	Diluent Estimated Volume (million gallons	Test Type[b]	Test Section	Timing Window Restriction
916.6	MN	Clearwater	West Four Legged Lake	West Four Legged Lake	0.15	0.04	HDD	-	No in-channel work from March 15 through June 15
932.5	MN	_	TBD	TBD	0.06	0.01	HDD	-	TBD
939.7	MN	Beltrami	Mississippi River	Mississippi River	8.11	2.49	Pipeline	6	No in-channel work from March 15 – June 15
939.7	MN	Beltrami	Mississippi River	Mississippi River	7.26	2.24	Pipeline	7	No in-channel work from March 15 – June 15
939.7	MN	Beltrami	Mississippi River	Mississippi River	0.09	0.03	HDD	-	No in-channel work from March 15 – June 15
955.8	MN	Cass	Pike's Bay Channel	Pike's Bay Channel	0.12	0.04	HDD	-	No in-channel work from March 15 – June 15
986.0	MN	Itasca/ Cass	Mississippi River	Mississippi River	0.20	0.06	HDD	-	No in-channel work from March 15 – June 15
989.5	MN	Itasca	Ball Club River	Ball Club River	7.60	2.35	Pipeline	8	No in-channel work from April 1 to June 30
989.5	MN	Itasca	Ball Club River	Ball Club River	0.08	0.02	HDD	-	No in-channel work from April 1 to June 30

TABLE 4.7.3-2 (continued)
Hydrostatic Testing Water Source Locations for the Alberta Clipper Project

Milepost	State	County	Water Source	Discharge Location[a]	Alberta Clipper Estimated Volume (million gallons)	Diluent Estimated Volume (million gallons	Test Type[b]	Test Section	Timing Window Restriction
995.3	MN	Itasca	Deer River	Deer River	0.07	0.02	HDD	-	No in-channel work April 1 - June 30
1010.0	MN	Itasca	Prairie River	Prairie River	3.80	1.17	Pipeline	9	No in-channel work from April 1 through June 30
1010.0	MN	Itasca	Prairie River	Prairie River	9.17	2.83	Pipeline	10	No in-channel work from April 1 through June 30
1010.0	MN	Itasca	Prairie River	Prairie River	0.10	0.03	HDD	-	No in-channel work from April 1 through June 30
1046	MN	St. Louis	Savanna River	Savanna River	7.71	2.38	Pipeline	11	No in-channel work from April 1 through June 30
1046/ 1094.4	MN/WI	St. Louis/ Douglas	Savanna River/ Pokegama River	Savanna River/Pokegama River	6.51	2.01	Pipeline	12	No in-channel work from April 1 through June 30 (Savanna River) No in-channel work from April 1 through June 1 (Pokegama River)
Total					**87.99**	**15.72**			

TABLE 4.7.3-2 (continued)
Hydrostatic Testing Water Source Locations for the Alberta Clipper Project

[a] Locations where multiple withdrawals and discharges would occur.

[b] The entire pipeline is hydrostatically tested. Given the expense associated with horizontal directional drilling methods, these sections are hydrostatically tested twice.

N/A = Not applicable.

TBD = To be determined. The remaining sources for hydrostatic test water will be determined in May and included in the respective state permits.

Source: Enbridge 2009.

Removal of water from waterbodies can decrease water volume and flow, resulting in a decrease in habitat (wetted area in a stream or lake); degradation of water quality (increased temperature and decreased dissolved oxygen [DO]); and entrainment of small fish, eggs, and macroinvertebrates during water extraction. Enbridge would adhere to agency recommendations on timing windows for instream work in order to minimize impacts to the resources.

Most of the fish species located along the Alberta Clipper Project route spawn from April to June. If Enbridge performs the testing during this time frame, there would be an increased coincidence with sensitive reproductive periods for multiple fish species. Spawning fish could be affected through decreases in water levels (displacing spawning habitat) and water quality degradation. Fish eggs could be affected through desiccation if the water levels drop, entrainment within the test water, and delayed development due to impaired water quality. Larval and juvenile fish could be affected through entrainment during water withdrawal, decreased survivability due to poor water quality, and reduced habitat and food sources through entrainment of macroinvertebrates and decreased suitability of production areas with lower flows.

The discharge of large volumes of hydrostatic test waters into surface waters could temporarily cause a change in the water temperature and DO levels, could increase downstream flows, and could increase streambank and substrate scour. Among the list of proposed water sources all 15 are known to contain sensitive species. The impacts caused by the hydrostatic testing could be reduced by avoiding the use of waterbodies with commercially or recreationally important species as intake sources.

If interbasin transfers of water occur, there is also the potential to introduce and spread aquatic nuisance species; however, as stated in the state-specific EMPs (Appendix C) hydrostatic test waters would be discharged through a filtering device back to the source waterbody. If required by state or tribal permits, discharged water will be collected and sampled. The proposed source waterbodies include some locations that have been identified as containing non-native or exotic fish species (USGS 2007). These largely consist of the major recreational species, including bass and walleye.

4.7.4 Mitigation

Enbridge has coordinated with federal, state, and tribal agencies to identify appropriate crossing methods to limit potential impacts to fisheries. To further minimize impacts to fish and their habitats, Enbridge would implement several measures, as identified below.

MDNR has requested that stream crossings be perpendicular to the waterbody in order to minimize crossing length and impacts. Enbridge proposes to design all stream crossings to be as close to perpendicular as possible to minimize crossing lengths as requested by MDNR (see the state-specific EMPs [Appendix C]).

To minimize the impacts of construction activities on fish and their habitats, Enbridge generally would complete all open-cut instream activity for minor waterbody crossings within 24 hours and all activity for intermediate and major waterbodies within 48 hours (not including those crossed by HDD).

Spawning periods for most (warmwater) fish species in the Alberta Clipper Project area extend from April to June. To minimize impacts to fisheries resources, NDGFD, MDNR, and WDNR have requested the following timing window restrictions:

- No instream work from April 15 through June 1 for North Dakota coolwater and warmwater fisheries;

- No instream work in trout streams and tributaries to trout streams between September 1 and April 15 west of Itasca County and from September 15 through April 30 for Itasca County east to the Minnesota-Wisconsin border;
- No instream work between April 1 and June 30 for Minnesota coolwater and warmwater fisheries; and
- No instream work in Wisconsin waterbodies from April 1 to June 30.

Agency timing window restrictions that Enbridge would adhere to have been noted in Table 4.7.1-1 and Appendix P.

To minimize streambank erosion, Enbridge would use equipment bridges and mats to support construction equipment that must cross the waterbody to access construction areas, except for drainage ditches, intermittent streams, and other non-fisheries waters (unless required by a permit). Immediately after the initial disturbance of the substrate at all flowing waterbody crossings, the contractor would install temporary sediment barriers across the entire construction right-of-way, 10 feet from the water's edge to maximize the amount of runoff intercepted. The sediment barriers would consist of silt fences (equal to or greater than 36 inches high) or staked straw bales that would act to stop the flow of sediments into the waterbody, prevent deposition of sediments into sensitive resources, and contain any spill within the construction right-of-way. The sediment barriers would be repaired or replaced prior to forecasted inclement weather or within 24 hours of discovery that the barriers are not functional. All spoil from minor and intermediate waterbody crossings and spoil from major waterbody crossings where spoil would be removed from the stream would be placed within sediment barriers in the construction right-of-way, at least 10 feet from the active channel or in an additional extra work area. For dry crossings using flume methods, the flume pipe would be aligned to prevent bank erosion and streambed scour, and would not be removed until the final cleanup of the streambed and bank is virtually complete. Mitigation for all applicable crossing methods would include stabilization of the streambed and streambanks after construction to avoid or minimize erosion and resulting sedimentation.

To reduce the impacts caused by the removal of riparian cover, Enbridge generally would maintain a 20-foot buffer of undisturbed vegetation along streambanks during initial clearing and until trenching begins. Woody vegetation may be hand-cleared within the buffer; however, herbaceous vegetation would be left intact until the contractor is ready to construct. After construction is complete, the banks of the waterbodies would be stabilized with temporary sediment barriers within 24 hours (weather and soil conditions permitting) of completing the activities. Enbridge would restore the slopes of the streambanks as near as practical to pre-construction conditions unless the slope was determined to have been unstable during pre-construction surveys. In these cases, the banks would be reshaped to transition the disturbed area into the natural streambank. After the streambanks were reestablished, all non-protected streambanks would be reseeded with a standard upland seed mix consisting of timothy, perennial ryegrass, wild-rye, switchgrass and oats (during summer seeding) or winter wheat (during winter seeding), and annual ryegrass or slender wheat grass. Based on consultations with MDNR, Enbridge proposes to use a special seed mix for streambanks along protected waters. This seed mix would consist of a mixture of 25 seeds such as ryegrass, bluegrass, and sedge. Streambank areas would be covered with erosion control materials such as jute after re-seeding. In the event that a waterbody crossing is located within or adjacent to a wetland crossing, wetland crossing mitigation measures—such as the use of construction mats and temporary erosion control devices—would be implemented to the extent practical.

Enbridge has proposed locating the primary staging areas for materials and equipment for waterbody crossings at least 10 feet from the active channel. To further reduce the impacts to the waterbody and to the extent possible, Enbridge proposes to locate all extra work areas (temporary staging areas, additional spoil storage areas) at least 50 feet from the active channel.

To reduce the chance of spreading organisms between waterbodies, Enbridge proposes to clean construction equipment prior to arriving at the Project site (see the state-specific EMPs [Appendix C]). In Wisconsin, Enbridge has stated that equipment would be cleaned in accordance with Wisconsin statute NR 320.06. Cleaning for all states would include inspection of equipment for mud and vegetation debris as well as draining of any lake or river water from the equipment. In addition, Enbridge proposes to perform one of the following additional cleaning procedures when air temperatures are above 19° F at the time of decontamination:

- Allow equipment to dry for not less than 5 days prior to transportation and use at other sites;
- Wash equipment with water not less than 212° F;
- Wash equipment with soap and water or high-pressure water of not less than 2,000 pounds per square inch pressure,
- Disinfect equipment with 200 parts per million (ppm) (0.5 ounce per gallon) chlorine for not less than 10 minutes contact time; or
- Disinfect with another state-approved disinfectant.

Viral hemorrhagic septicemia (VHS), a viral fish disease that often results in mortality, has been found in fishes of the Great Lakes. According to MDNR, VHS has been found in Lake Huron, Lake St. Clair, Lake Erie, Lake Ontario, Lake Michigan, and the St. Lawrence River in New York. VHS has also been detected in several inland lakes, including Budd Lake in Michigan and Lake Winnebago in Wisconsin (MDNR 2008b). VHS has not been detected in any of the waterbodies crossed by the proposed Project. As stated above, Enbridge proposes to clean construction equipment prior to arriving at the Project site. Even though VHS has not been found within waterbodies proposed to be crossed by the Alberta Clipper Project, using cleaned equipment should further minimize any potential to introduce VHS.

Selection of the HDD crossing methodology is mitigation for potential environmental impacts associated with other more intrusive crossing techniques. However, this method requires suitable substrate conditions and involves longer construction times, specialized equipment, and increased construction effort. The use of BMPs as described in the state-specific EMPs (Appendix C) would minimize any ancillary impacts associated with the overall construction effort in the vicinity of HDD water crossings. As stated previously, HDD carries the risk of a frac-out or escape of drilling fluids into the waterbody; however, Enbridge proposes to minimize the potential for the release of drilling fluids by following the mitigation recommendations in their Drilling Mud Containment, Response, and Notification Plan (Appendix G). Mitigation measures include having trained on-site observers to quickly determine any release of drilling muds, immediately available containment equipment such as straw bales and fencing to quickly respond to any releases, and procedures in place to quickly clean up any released materials. No specific mitigation is proposed or warranted for use of a bore crossing method.

To minimize the potential impact to fish during withdrawal of hydrostatic test water, Enbridge proposes to install intakes with filtering and screening devices (with openings no greater than 1 inch to preclude larger fish from being pulled in with the test water) and suspend the intakes within the waterbody or just below the surface of the water. Withdrawals would be made at controlled rates to protect aquatic life, provide for all waterbody uses, and avoid effects on downstream withdrawals of water by existing users. When using the dam-and-pump method, screening devices would be installed at the pump intakes to minimize entrainment impacts to aquatic species. With the use of intake screens, timing windows to avoid instream work during spawning periods, and additional measures previously discussed, impacts to fish (including larval and juvenile stages) during hydrostatic testing would be adequately minimized.

Discharge controls to reduce water quality effects include restrictions on pipeline dewatering rates, energy dissipaters to prevent erosion (such as a splash pup), and erosion controls such as plastic sheeting if water is allowed to flow on land and into the receiving waterbody.

Enbridge would not use additives (biocides) in the hydrostatic test water.

As stated earlier, to minimize the risk associated with introduced species, Enbridge proposes to allow hydrotest equipment (such as pumps and hoses) to desiccate between test sites, wash the equipment, or disinfect the equipment with 200 ppm chlorine solution (or other state-approved disinfectant). The equipment also would undergo a visual inspection prior to use at the next site.

4.7.5 Connected Actions

The Superior Terminal Expansion Project in Superior, Wisconsin is considered a connected action to the proposed Project. Enbridge has proposed to install five new storage tanks at the Superior Terminal, each with a nominal capacity of 250,000 barrels. The new tanks and all associated equipment and facilities would be installed inside the existing boundaries of the terminal, as depicted in Figure 2.9.2-1. No waterbodies would be crossed during construction of the connected action; therefore, no impacts to fisheries would be expected with the connected action. Additional information about potential cumulative impacts to water quality and fisheries associated with actions at the Superior Terminal is provided in Section 4.14.18.2.

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4.8 THREATENED, ENDANGERED, AND SENSITIVE ANIMALS AND PLANTS

This section addresses species that are federally-listed, state-listed, or tribally designated as endangered, threatened, or candidate species, and species of conservation concern (defined as conservation priority by North Dakota; special concern species by Minnesota, FDL, and Wisconsin; or sensitive species by the CNF Regional Forester and LLBO). Information on species occurrence, life history descriptions, and impact assessments is based on available literature; correspondence and communications with federal, state, and tribal agencies; agency required site-specific surveys; websites; and review of state natural heritage programs including element occurrence records.

4.8.1 Federally-Listed Threatened, Endangered, and Candidate Species

In accordance with Section 7 of the ESA, DOS (as the lead agency), in coordination with FWS, must ensure that any action authorized, funded, or carried out does not jeopardize the continued existence of a federally-listed threatened or endangered species, or result in the adverse modification of federally designated critical habitat for any federally-listed species. For actions involving major construction activities with the potential to affect listed species or designated critical habitats, DOS must report its findings to FWS in a Biological Assessment (BA). To comply with Section 7 of the ESA, we requested in the DEIS that FWS consider the EIS and Appendix W as the BA for the proposed Project.

Enbridge, as DOS's non-federal designee, initiated Section 7 informal consultation with FWS in August 2006 by sending a Project overview and information request letter. The FWS field offices participating in the consultation are Bismarck, North Dakota; Twin Cities, Minnesota; and Green Bay, Wisconsin. Meetings between Enbridge, FWS, and other federal agencies were held in August 2006 and in May 2008. The Section 7 informal consultation with FWS has been completed, and FWS has concurred with the determinations presented below for federally-listed threatened, endangered and candidate species (FWS 2009).

Federally listed threatened, endangered, or candidate species identified by FWS as potentially being affected by the Alberta Clipper Project include Kirtland's warbler, piping plover, Canada lynx, gray wolf (the gray wolf was officially delisted on May 4, 2009), Dakota skipper, and western prairie fringed orchid (FWS 2006a, 2006b, 2008b) (Table 4.8.1-1). The distribution, life histories, and habitat requirements for these species are discussed below, followed by an analysis of Project impacts, proposed and recommended mitigation, and a preliminary determination of effects. The species occurrence was determined based on the Minnesota Natural Heritage element occurrence records database review (Appendix W).

4.8.1.1 Kirtland's Warbler

Background

The Kirtland's warbler is federally-listed as endangered throughout its range and is one of the rarest birds in North America. This species has very specialized nesting habitat requirements, with a nesting period lasting from late May to early July. Threats to this species include breeding habitat loss and degradation due to a reduction in fires and forestry practices, potential loss of critical wintering habitat, cowbird parasitism, and physical dangers to migrating birds (Kreitinger and Paulios 2007).

TABLE 4.8.1-1
Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	State and Tribal Status[a]	Counties/State	Preferred Habitat	Preliminary Determination
Birds					
Kirtland's warbler (*Dendroica kirtlandii*)	E	WI/SC	Douglas/WI	Nests in stands of scrubby jack pine. Breeds May and June. No current records and no suitable habitat crossed by right-of-way.	No effect
Piping plover (*Charadrius melodus*)	E	ND/SC, MN/E, WI/E, LLBO/E	St. Louis, Cass/MN; Douglas/WI	Suitable habitats in open sandy areas, saline flats, sandbars, and sand and gravel beaches along rivers and gravel pits. Breeds April to September. No current records and no suitable habitat crossed by right-of-way.	No effect
Mammals					
Canada lynx (*Lynx canadensis*)	T	MN/NL, WI/SC, LLBO/E	Aitkin, Beltrami, Carlton, Cass, Clearwater, Hubbard, Itasca, Marshall, St. Louis/MN; Douglas/WI	Boreal regions dominated by coniferous or mixed forests. Dens in mature or old-growth forests with high density of logs. Breeds late winter-early spring.	Not likely to adversely affect
Gray wolf (*Canis lupus*)	E/T[b]	ND/SC, MN/SC, WI/SC, LLBO/SC	Pembina/ND, All counties/MN, Douglas/WI	Suitable habitats in the Project area include hardwood forest, mixed forest, and grasslands. Dens dug in suitable soils or uses dens initiated by other animals. Breeds February to late-June.	Not likely to adversely affect
Insects					
Dakota skipper (*Hesperia dacotae*)	C	MN/T	Kittson, Polk/MN	Prefers native prairies (lowland and upland prairies) containing a high diversity of wildflowers and grasses. Not reported in habitats crossed by the proposed Project.	NA
Plants					
Western prairie fringed orchid (*Platanthera praeclara*)	T	ND/SC, MN/T	Kittson, Pennington, Polk, Red Lake/MN	Occurs in mesic-wet tall-grass native prairie, herbaceous wetlands, and dune complexes. Blooms May to August. Reported east of the right-of-way in Kittson County, Minnesota.	Not likely to adversely affect

TABLE 4.8.1-1 (continued)
Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring along the Alberta Clipper Project Route

C = Candidate.
E = Endangered.
NA = Not applicable.
NL = Not listed.
SC = Species of conservation concern.
T = Threatened.

[a] Species designated as E, T, or SC by North Dakota (ND), Minnesota (MN), Wisconsin (WI), and the Leech Lake Band of Ojibwe (LLBO) tribe that potentially occur in counties crossed by the Alberta Clipper Project.

[b] Designations for the gray wolf have varied over the past year; however, the population that occurs within the proposed Project area was delisted in a final rule published April 2, 2009, effective May 4, 2009).

Sources: MDNR 2006, 2008c; MNR 2008a; NDGFD 2006a; WDNR 2007; FWS 2006a, 2006b, 2008b;FDL 2007; LLBO 2008.

Kirtland's warblers nest in jack pine forests, usually in patches greater than 500 acres in area, and most often in much more extensive forest patches. Jack pine stands favored by this species are young, ranging from 5.0 to 6.5 feet tall. As stands mature, their suitability as nesting habitat decreases. Kirtland's warblers nest on the ground, concealing the nest among grasses often at the base of pine trees. Surrounding vegetation may include grasses, sedges, cherry, blueberry, and ferns (Kreitinger and Paulios 2007). Kirtland's warblers exist in several Wisconsin locations (Kreitinger and Paulios 2007). Singing summer males have been recorded in Douglas County, Wisconsin; the first successful nesting was recorded in Adams County, Wisconsin in 2008 (FWS 2008c). No Kirtland's warblers or suitable habitats have been reported along the Alberta Clipper right-of-way (FWS 2006a, 2006b).

Impact Assessment

The Kirtland's warbler is not known to inhabit the proposed Alberta Clipper Project area. This species requires young stands of jack pine greater than 500 acres. Fragmentation of patches of forest habitats would be exacerbated by widening of the existing right-of-way from 125 to 200 feet. Construction of the Alberta Clipper Project would reduce the availability of suitable nesting habitat for this species, if suitable nesting habitat occurred. No jack pine forest stands documented within the Minnesota County Biological Survey Native Plant Communities database (MCBS 2008) would be crossed by the Alberta Clipper Project; therefore, it is unlikely that any suitable habit at for this species would be lost due to construction or operation of the Alberta Clipper Project.

Mitigation and Monitoring

As discussed in Section 4.6.3, and in accordance with expected permitting requirements, we recommended that Enbridge finalize plans to survey for migratory bird nests during the nesting season and continue to develop measures to avoid impact to migratory bird nests that occur in the Project area. As the Kirtland's warbler is a migratory bird species protected by the MBTA, mitigation measures developed by the Applicant in consultation with FWS would further minimize potential impacts to the Kirtland's warbler. As stated in Enbridge's Migratory Bird Plan (Appendix V), clearing within Douglas County, Wisconsin would occur within the nesting period for this species; however, Enbridge would conduct pre-construction nesting surveys for this area and would implement site-specific measures to protect any nest encountered.

Determination of Effect

Because no Kirtland's warblers, designated critical habitat, or habitats suitable for the Kirtland's warbler are known to occur along the proposed Alberta Clipper right-of-way, and because additional surveys would be conducted prior to construction in Douglas County, Wisconsin, the Alberta Clipper Project would not affect the Kirtland's warbler.

4.8.1.2 Piping Plover

Background

The Great Lakes population of the piping plover is federally-listed as endangered, is state-listed as endangered in Minnesota and Wisconsin, and is designated as an endangered species on the LLR. Piping plovers occurring in the Alberta Clipper Project area likely would belong to the Great Lakes population, which has increased from 20 breeding pairs in the early 1990s to over 60 breeding pairs in 2007 (FWS 2008a). Some migrant birds, however, especially those noted as migrants through Cass County, Minnesota on the LLR may belong to the federally-listed threatened Northern Great Plains population, which has a nesting colony on Lake of the Woods near the northern border of Minnesota.

Piping plovers forage for invertebrates on exposed beach substrates, nesting on unvegetated or sparsely vegetated sandbars in river channels and wetlands from about April 15 through September 15. Critical habitat for the Great Lakes population of piping plovers has been designated along the shoreline of Lake Superior at Duluth Harbor in St. Louis County, Minnesota and at Wisconsin Point in Douglas County, Wisconsin (FR 66[88]:22938–22969 May 7, 2001).

Channel constrictions caused by bridges, causeways, bridge approaches, roadway embankments, bank stabilization, levees, and other unnatural obstructions can result in the loss of broad, shallow, unobstructed channel and sandbar complexes used as feeding and nesting habitats by piping plovers. Poorly timed human activities in the vicinity of feeding and nesting habitats can disturb piping plovers, resulting in diminished reproduction.

Impact Assessment

Piping plovers are known to nest along the Lake Superior shoreline and may nest on the major river systems in North Dakota, Minnesota, and Wisconsin. Consultation with federal, state, and tribal resource agencies has indicated that, with the exception of possible migrants, the piping plover does not occur in habitats crossed by the proposed Alberta Clipper pipeline and would not be affected by construction or operation of the proposed Project. Designated critical habitats for this species along the shorelines of Lake Superior do not occur within the Project area and would not be affected by construction or operation of the proposed Alberta Clipper pipeline.

Mitigation and Monitoring

As discussed in Section 4.6.3, and in accordance with expected permitting requirements, we recommended that Enbridge finalize plans to survey for migratory bird nests during the nesting season and continue to develop measures to avoid impact to migratory bird nests that occur in the Project area. As the piping plover is a migratory bird species protected by the MBTA, mitigation measures developed by the Applicant in consultation with FWS would further minimize any potential impacts to the piping plover.

Determination of Effect

Because the piping plover is not known to, and is not expected to, occur in the Project area and no designated critical habitats would be crossed by the Project, the Alberta Clipper Project would not affect the piping plover.

4.8.1.3 Canada Lynx

Background

The Canada lynx was federally-listed as threatened in 2000. Within the proposed Project area, it occurs in Minnesota and Wisconsin; however, the species is not known to occur in North Dakota. The lynx was once hunted and trapped in Minnesota and throughout its range but has been protected in Minnesota since 1984. The lynx is a solitary animal that lives in dense forests across northern Canada and in northern Minnesota. Snowshoe hares are their main prey; but birds, small mammals, and roadkill also are eaten. Lynx do not occur where snowshoe hares are absent, and their abundance follows that of their primary prey. Mating occurs in late winter, and one to five kittens are born about 65 days later.

MDNR has been tracking lynx sightings since they were federally-listed; and the species has been sighted in many counties crossed by the proposed Alberta Clipper Project area, including Aitkin, Beltrami,

Carlton, Cass, Clearwater, Hubbard, Itasca, Marshall, and St. Louis Counties in Minnesota (MDNR 2008a). In addition, lynx have been reported in the vicinity of the proposed pipeline in Carlton, Cass, Clearwater, Hubbard, Itasca, and St. Louis Counties in Minnesota. Evidence of lynx reproduction has been recorded in Carlton and St. Louis Counties. Lynx also have been sighted in Douglas County, Wisconsin (Wiedenhoeft and Wydeven 2006). Critical habitat for this species has been designated in northeastern Minnesota in Cook, Lake, Koochiching, and St. Louis Counties (FR 73[40]:10860-10896). Additional analysis of the Canada lynx is presented in Appendix W.

Impact Assessment

The Canada lynx rarely occurs within the Alberta Clipper Project area. These secretive cats would be most likely to inhabit forested portions of the Alberta Clipper Project area in Minnesota and Wisconsin. Canada lynx range widely in search of snowshoe hares. If hares occur in high numbers in the Project area during construction, the likelihood of encounters between construction equipment and Canada lynx would increase. Construction of the Alberta Clipper Project would affect an estimated 855 acres of state and national forestlands. Approximately 1,948 acres of upland and wetland forested habitat potentially used by lynx or supporting prey species in Minnesota and Wisconsin would be cleared during construction of the Alberta Clipper Project. Of this, approximately 1,033 acres would be permanently maintained in an herbaceous state.

The large majority of the right-of-way would be collocated with the existing Enbridge right-of-way. Fragmentation of forested habitats would be exacerbated by widening of the existing right-of-way from 125 to 200 feet where the Alberta Clipper Project is collocated with the existing Enbridge right-of-way. Although rare in the proposed Project area, they have been documented to cross the existing right-of-way (Appendix W), the widened pipeline right-of-way would be unlikely to block or alter movements of lynx. Critical habitat has been designated for the Canada lynx in St. Louis County, Minnesota; however, at the closest point, the critical habitat is approximately 6.6 miles north/northwest of the proposed Project.

Mitigation and Monitoring

Enbridge has committed to implementing the following measures in its state-specific EMPs (Appendix C) to protect wildlife and wildlife habitats that would minimize impacts to the Canada lynx and their primary prey:

- Open trenches would have sloped ends (more so than the side walls) to allow small mammals to escape if they were to fall in the trench.
- Soil compaction would be minimized to maintain or restore suitable burrowing habitat for small mammals by suspending specific construction activities on susceptible soils, conducting compaction testing, and using tillage equipment to alleviate compaction.
- Temporarily cleared areas (rights-of-way and workspaces) would be reseeded to reestablish suitable habitat to bring back temporarily displaced wildlife.
- Tree removal would be minimized where windbreaks and shelterbelts would be crossed by minimizing the width of the right-of-way necessary for the trench line and vehicle traffic. Trees would be felled into the right-of-way to minimize damage to off-right-of-way vegetation.
- Wildlife buffers would be installed in riparian habitats by reestablishing suitable woody species to provide cover for wildlife travel corridors in riparian areas.

Determination of Effect

Because no designated critical habitat for Canada lynx would be crossed by the Project and lynx would occur only rarely in the Project area, the Alberta Clipper Project would not affect designated critical habitat and may affect, but is not likely to adversely affect, the Canada lynx (FWS 2006a, 2006b; Appendix W).

4.8.1.4 Gray Wolf

Background

The gray wolf was federally-listed as endangered in North Dakota and Wisconsin; is federally-listed as threatened in Minnesota; however, a final rule dated April 2, 2009 (effective May 4, 2009) delisted the gray wolf in the Project area. The species is also listed as a state species of conservation concern in North Dakota, Minnesota, and Wisconsin. It has also been listed as sensitive on the LLR by LLBO. The gray wolf that occurs throughout the Alberta Clipper Project area belongs to the Great Lakes Region population and the Western Great Lakes distinct population segment (WGL DPS). On March 12, 2007, the gray wolf was removed from the endangered species list in the Alberta Clipper Project area: in North Dakota, Minnesota, and Wisconsin. On September 29, 2008, however, the U.S. District Court for the District of Columbia vacated the final rule to remove the WGL DPS from the list of endangered and threatened wildlife and the final rule reinstating ESA protection for the WGL DPS was issued on December 11, 2008. On January 14, 2009, a final rule to delist the WGL DPS of the gray wolf was published; however, on January 20, 2009, this rule was withdrawn. On March 6, 2009, the Secretary of the Interior affirmed the decision to delist the WGL DPS, and the final rule to officially designate the WGL DPS, and delist it, was published on April 2, 2009. Because the listing status for this species has changed numerous times, it has been retained for evaluation of potential Project impacts. Previously designated critical habitat for this species has been designated in northeastern Minnesota in Beltrami, Cook, Itasca, Coochiching, Lake, Lake of the Woods, Roseau, and St. Louis Counties (FR 43[47]:9607-9615); however, the designation of critical habitat within these counties was revoked in the April 2, 2009 final rule.

The most recent population survey data (2003 to 2006) indicate that about 3,020 wolves occur in Minnesota and 465 wolves occur in Wisconsin (FWS 2007b). For gray wolves in the WGL DPS, remaining threats are primarily the various forms of human-caused mortality that have been reduced by provisions of the ESA, including wolves killed legally and intentionally for depredation control, threat reduction, research, or other reasons; accidental mortalities (e.g., vehicle collisions and incidental trapping mortalities); and illegally killed wolves.

Wolves live in social groups called a “pack,” with six to 10 animals, including the dominant male and female (the breeding pair), pups from the previous year (yearlings), the current year's pups, and occasionally other subordinate adults. The dominant pair raises the young, selects denning and rendezvous sites, captures food, and maintains the territory. A wolf pack’s territory may cover from 20 to 120 square miles. Wolves are carnivores that feed on white-tailed deer, beavers, snowshoe hares, mice, squirrels, muskrats, and other small mammals. The bulk of their diet is white-tailed deer. Wolves are likely to occur throughout the Alberta Clipper Project area in North Dakota, Minnesota, and Wisconsin. Gray wolf den and rendezvous habitats potentially occur along the Project route.

Impact Assessment

The gray wolf may occur regularly throughout the Alberta Clipper Project area. The Alberta Clipper Project could affect gray wolves by interrupting foraging and reproductive activities due to exposure to

Project-related noise and from increased human activity. The Alberta Clipper pipeline would cross 13 miles of Douglas County, Wisconsin that is considered primary wolf habitat (WDNR 1999). Historically, this area has been an occupied wolf territory based on field signs and reports of wolf observations (WDNR 1999). Construction of the Alberta Clipper Project would likely displace a few gray wolves and alter used habitats, especially if packs currently use the existing right-of-way as a travel corridor. Construction-related disturbance at den sites could reduce pup survival. Post-construction disturbances, such as public and private use of all-terrain vehicles (ATVs) along the Enbridge right-of-way, including snow machines and ATVs, could reduce habitat suitability for use by the gray wolf. In addition, wolf-vehicle collisions continue to be a major contributor to wolf mortality. The Alberta Clipper Project is south of all designated critical habitat for the gray wolf in Beltrami, Itasca, and St. Louis Counties, Minnesota.

Mitigation and Monitoring

Mitigation of Project-related impacts on the gray wolf would be similar to those described for the Canada lynx in Section 4.8.1.3. In addition, Enbridge has committed to the following mitigation specific to the gray wolf:

- Avoid construction activity within 0.5 mile of known den or rendezvous sites from March 1 through July 31 in Minnesota or Wisconsin;
- Provide Environmental Inspectors with copies of wolf management guidelines, which describe how wolf dens and rendezvous sites would appear in the field; and
- Notify FWS and MDNR or WDNR immediately if Environmental Inspectors or other Project personnel observe any wolves or possible dens or rendezvous sites prior to or during construction.

Determination of Effect

Construction of the Alberta Clipper pipeline would result in a small reduction in available habitats and short-term displacement of a few individual gray wolves from the Project area. Impacts to gray wolves would be minimized by implementation of Enbridge's state-specific EMPs (Appendix C), as discussed for the Canada lynx in Section 4.8.1.3 and the specific mitigation measures for wolves, as discussed above. No designated critical habitat for the gray wolf would be crossed by the proposed Alberta Clipper Project. The Alberta Clipper Project may affect, but is not likely to adversely affect the gray wolf or the WGL DPS of the gray wolf and would have no effect on the previously designated critical habitat for the gray wolf in Minnesota (the designation was revoked per the April 2, 2009 final rule).

4.8.1.5 Dakota Skipper

Background

The Dakota skipper (butterfly) is a federal candidate species and state-listed threatened species in Minnesota. Their historical range is unclear because extensive destruction of native prairies preceded widespread biological surveys; however, records of the species have been found from northeast Illinois to southern Saskatchewan. Today, the Dakota skipper is found in North Dakota and Minnesota prairies containing a high diversity of wildflowers and grasses. In the vicinity of the Alberta Clipper Project, the Dakota skipper occurs in Kittson and Polk Counties in Minnesota.

One of the best indicators for Dakota skipper habitat is the presence of food plants for larva and nectar plants for adults. Habitats include low (wet) prairie dominated by bluestem grasses, wood lily, harebell,

and smooth camas; and upland (dry) prairie on ridges and hillsides dominated by bluestem grasses, needlegrass, pale purple and upright coneflowers, and blanketflower. Nectar provides the nutrients and carbohydrates for Dakota skippers to meet the energetic demands of flight. Grassland sites with a diverse mix of native forbs, one or two of the known larvae or pollen plants, and proximity to other native grassland areas are considered suitable habitats.

Threats to Dakota skipper habitat include burning, haying, grazing, pesticide use, and invasion by non-native plants—including exotic pasture grasses. All of these activities have the potential to increase prairie fragmentation. Increased prairie fragmentation isolates remaining populations, preventing the reestablishment of populations made extinct by burning, grazing, or other causes—or reducing the genetic diversity that may be needed to adapt to environmental changes. Disturbed prairie soils are extremely slow to redevelop; and the disruption of prairie sod encourages establishment of exotic pasture grasses, especially smooth brome, and establishment of noxious weeds.

Impact Assessment

The Alberta Clipper Project would cross remnant prairie habitats potentially containing the Dakota skipper at the following locations:

- Kittson, Minnesota – MP 816 to MP 817 – Mesic Prairie Remnant; and
- Polk, Minnesota – MP 885.7 to MP 890 – Mesic/Wet Prairie Remnant.

Continued consultation with FWS indicates that the Dakota skipper is not known to occur in the native prairie remnants crossed by the Alberta Clipper Project. In addition, these native prairie remnants would be preserved intact, as they are adjacent to railroad rights-of-way and would be crossed by horizontal bore.

Mitigation and Monitoring

As noted, native prairie remnants considered potential habitat for the Dakota skipper within the construction right-of-way would be crossed by horizontal bore, avoiding direct impacts to the habitats. To further minimize impacts to these habitats, Enbridge would implement measures in the state-specific EMPs (Appendix C), Revegetation and Restoration Monitoring Plans (Appendix K), and Noxious Weed Plans (Appendix H) to ensure that no sediment flows off right-of-way areas, disturbed areas are reseeded with appropriate seed mixes, and revegetation occurs in a way that avoids or minimizes the potential for noxious weed invasion.

Determination of Effect

Although the Dakota skipper is a federal candidate species and a determination of effect to the species is not required, we have evaluated the likelihood of occurrence of this species in the Project area and the conservation measures proposed by the Applicant. The Alberta Clipper Project may affect the Dakota skipper but is not likely to contribute to listing of the species as threatened or endangered under the ESA.

4.8.1.6 Western Prairie Fringed Orchid

Background

The western prairie fringed orchid is federally-listed as threatened, state-listed as threatened in Minnesota, and a species of conservation concern in North Dakota. The species is found in tall-grass calcareous silt loam or sub-irrigated sand prairies in North Dakota and Minnesota. The species also may occur along

ditches or roadsides. Flooding may be an important agent of seed dispersal (Hof et al. 1999), although seeds develop into flowering plants only under appropriate hydrologic and other conditions. In the vicinity of the Alberta Clipper Project, the western prairie fringed orchid reportedly occurs in Kittson, Pennington, Polk, and Red Lake Counties in Minnesota. Recent surveys along the pipeline right-of-way documented a population east of the right-of-way in Kittson County.

The western prairie fringed orchid is difficult to detect and flowers from mid-June to mid-July. Declines in western prairie fringed orchid populations have been caused by drainage and conversion of its habitats to agricultural production, channelization, siltation, road and bridge construction, grazing, haying, and herbicide application.

Impact Assessment

Suitable habitat for western prairie fringed orchid in Minnesota includes wet or moderately moist (mesic) prairie or sedge meadows, with level or gently sloping topography. No critical habitat has been designated for the western prairie fringed orchid. The Alberta Clipper Project would cross remnant prairie habitats in counties potentially containing habitat suitable for supporting the western prairie fringed orchid at the following locations:

- Kittson, Minnesota – MP 816 to MP 817 – Mesic Prairie Remnant;
- Pennington, Minnesota – MP 853 to MP 854 – Mesic Brush Prairie; and
- Red Lake/Polk, Minnesota – MP 885.7 to MP 890 – Mesic/Wet Prairie Remnant.

Mitigation and Monitoring

With the exception of the native prairie remnant that would be crossed between MP 853 and MP 854, each of the remnants that potentially contain habitat for the western prairie fringed orchid would be crossed by horizontal bore or avoided during construction. To further minimize impacts to these habitats, Enbridge would implement measures in its state-specific EMPs (Appendix C), Revegetation and Restoration Monitoring Plans (Appendix K), and Noxious Weed Plans (Appendix H) to ensure that no sediment flows off right-of-way areas, disturbed areas are reseeded with appropriate seed mixes, and revegetation occurs in a way that eliminates or minimizes the potential for noxious weed invasion.

Impacts to the potential habitat between MP 853 and MP 854 would be minimized by construction of the pipeline on the north side of the right-of-way, where the habitat is less sensitive; however, to further minimize impacts to this habitat, and in accordance with expected COE and MPUC permitting requirements, we recommended in Section 4.5 that Enbridge develop a Construction and Mitigation Plan (CMP) for COE approval prior to construction through the area. The CMP would provide, among other things, an endangered resource plan; identification and inventory of existing plant communities; a preliminary wetland restoration plan; a replanting and reseeding plan; and a preliminary 5-year, site-specific, post-construction monitoring plan. In addition, we recommended that Enbridge take all necessary and reasonable measures to protect the wetland complex and submit proposed site plans to MDNR and MPUC 14 days prior to construction through the area.

Determination of Effect

Evaluation of the likelihood of occurrence of this species in the Project area, the conservation measures proposed by the Applicant, and the current and expected permitting requirements indicate that the Alberta Clipper Project may affect, but is not likely to adversely affect, the western prairie fringed orchid.

4.8.2 State-Listed Threatened and Endangered Species

Enbridge contacted the following state resource agencies, provided them with a Project overview, and requested information on state-listed threatened and endangered species with the potential to occur in the Alberta Clipper Project area:

- North Dakota Game and Fish Department (NDGFD);
- Minnesota Department of Natural Resources (MDNR); and
- Wisconsin Department of Natural Resources (WDNR).

State-listed threatened and endangered species identified by state resource agencies and tribes as potentially occurring in the Alberta Clipper Project area are listed in Table 4.8.2-1. State-listed species that are also federally-listed are included in Table 4.8.2-1 but are discussed and evaluated in Section 4.8.2.

4.8.2.1 American Peregrine Falcon

Background

The American peregrine falcon is no longer federally-listed as endangered. A final rule removed the American peregrine falcon from the federal list of endangered species on August 25, 1999. However, the peregrine falcon remains state-listed as threatened in Minnesota and as a species of conservation concern in North Dakota and Wisconsin. Historically, populations of peregrine falcons were drastically reduced by low productivity caused by the bioaccumulation of pesticides. Since organochlorine pesticides such as DDT have been banned, peregrine falcon numbers have been increasing.

Peregrine falcons nest on cliffs or man-made structures but occasionally use tree cavities or stick nests constructed by other raptors. Breeding occurs from March to July. They feed primarily on other birds such as songbirds, shorebirds, ducks, starlings, and pigeons (FWS 2006c). In the Alberta Clipper Project area, the peregrine falcon is most likely to nest on man-made structures (FWS 2003). Post-delisting monitoring indicates that the peregrine falcon is continuing to increase in abundance. Within the states crossed by the Alberta Clipper Project, the number of occupied territories includes one in North Dakota, 27 in Minnesota, and 17 in Wisconsin (FWS 2003).

Impact Assessment

There are no foreseen potential impacts to peregrine falcons because there is no documented nesting in the vicinity of the Alberta Clipper Project.

Mitigation and Monitoring

As the species is not known to nest in the vicinity of the proposed Project, no specific mitigation has been proposed by the Applicant or recommended by the applicable agencies. Any potential impacts would be minimized through the implementation of general wildlife mitigation measures, as discussed in Section 4.6.

Determination of Effect

As the American peregrine falcon is not known, and is not expected to occur, in the Project area, the Alberta Clipper Project would not affect the American peregrine falcon.

TABLE 4.8.2-1
State-Listed Threatened and Endangered Species Potentially Occurring along the Alberta Clipper Route

Species	Federal Status	State and Tribal Status [a]	Counties/State	Preferred Habitat	Preliminary Determination
Birds					
American peregrine falcon *(Falco peregrinus anatum)*	D	ND/SC, MN/T, WI/E	Itasca, St. Louis/MN	Nests on cliffs, river banks, tree hollows, large stick nests of other species or man-made structures. Breeds March to July. Various habitats; farmlands, marshes, lakeshores, rivers. Not reported near the Project right-of-way.	No effect
Cerulean warbler (*Dendroica cerulean*)		MN/SC WI/T	Douglas/WI	Nests in mature deciduous and occasionally mixed woodlands often near rivers and swamps. Breeds May to July. Prefers woodlands with well developed canopy and little understory. No suitable habitat crossed by right-of-way.	No effect
Common tern (*Sterna hirundo*)		WI/T	Douglas/WI	Nests on isolated, sparsely vegetated islands or peninsulas in large lakes, feeding areas downstream from Project right-of-way.	Not likely to adversely affect
Piping plover (*Charadrius melodus*)		ND/SC, MN/T, WI/E, LLBO/E	St. Louis, Cass/MN; Douglas/WI	Suitable habitats in open sandy areas, saline flats, sandbars, and sand and gravel beaches along rivers and gravel pits. Breeds April to September. No current records and no suitable habitat crossed by right-of-way.	No effect
Reptiles					
Blanding's turtle *(Emydoidea blandingii)*		MN/T, WI/T	Douglas/WI	Found in productive, clean, shallow waters with abundant aquatic vegetation and soft muddy bottoms over firm substrates. Found in ponds, marshes, swamps, bogs, wet prairies, river backwaters, sloughs, slow-moving rivers, protected coves, and lake shallows and inlets. Extensive marshes bordering rivers provide excellent habitat. Nests in grasses and sedge close to water. Note: No suitable habitat within Wisconsin Project area.	No effect
Wood turtle *(Clemmys insculpta)*		MN/T, WI/T	Carlton/MN, Douglas/WI	Prefers deciduous forests and open meadows along moderate to fast-moving streams and rivers. Nests in upland areas with loose or sandy soils next to streams and rivers. Breeds during early April through late August. Active from 15 March to 15 October. Note: No suitable habitat within Wisconsin Project area.	No effect

TABLE 4.8.2-1 (continued)
State-Listed Threatened and Endangered Species Potentially Occurring along the Alberta Clipper Route

Species	Federal Status	State and Tribal Status [a]	Counties/State	Preferred Habitat	Preliminary Determination
Insects					
Dakota skipper *(Hesperia dacotae)*	C	MN/T	Kittson, Polk/MN	Prefers native prairies (lowland and upland prairies) containing a high diversity of wildflowers and grasses.	Not likely to adversely affect
Plants					
Triangle moonwort *(Botrychium lanceolatum)*		MN/T, LLBO/T	Cass/MN	Grape Ferns & Moonworts (*Botrychium*) — Occurs in mesic hardwood forests. Leaves appear late spring and early summer. This species was not identified during surveys.	Not likely to adversely affect
Pale moonwort *(Botrychium pallidum)*		MN/E, LLBO/T	Cass/MN	Grape Ferns & Moonworts (*Botrychium*) — Occurs sporadically in fire-dependent forests. Leaves appear late spring and early summer. Six of eight known locations in Minnesota are on Leech Lake Reservation.	Not likely to adversely affect
St. Lawrence grape-fern *(Botrychium rugulosum)*		MN/T, LLBO/T	Cass/MN	Grape Ferns & Moonwort (*Botrychium*) — Occurs sporadically in fire-dependent forests. Leaves appear late spring and early summer. Several locations on Leech Lake Reservation.	Not likely to adversely affect
Floating marsh-marigold *(Caltha natans)*		WI/E	Douglas/WI	Emergent aquatic – Occurs in wet open shorelines of quiet streams and ponds, often associated with beaver-dammed streams in boreal forest. Blooms July. Identifiable early July to late August.	Not likely to adversely affect
Sterile sedge *(Carex sterilis)*		MN/T	Marshall/MN	Calcareous fen – Occurs in fens, opening in white-cedar swamps, wet calcareous prairies, fresh inter-dunal meadows, calcareous seeps, lake and river shores, and wet sunny limestone outcrops. Blooms spring. Identifiable late spring to early summer.	Not likely to adversely affect
Ram's head lady's slipper (*Cypripedium arietinum*)		MN/T	Cass/MN	Emergent aquatic – Occurs in swamps, bogs, or lowland forests. Blooms late May through mid-June.	Not likely to adversely affect
Slender spike rush *(Eleocharis nitida)*		WI/E	Douglas/WI	Emergent aquatic – Occurs near Lake Superior on wet exposed clay in ditches and openings in alder thickets and marshes. Blooms throughout June. Identifiable mid-June to late August. Species surveyed in Douglas County, Wisconsin between MP 1085 and MP 1097.	Not likely to adversely affect

TABLE 4.8.2-1 (continued)
State-Listed Threatened and Endangered Species Potentially Occurring along the Alberta Clipper Route

Species	Federal Status	State and Tribal Status [a]	Counties/State	Preferred Habitat	Preliminary Determination
Plants (continued)					
Marsh grass-of-parnassus *(Parnassia palustris)*		WI/T	Douglas/WI	Emergent aquatic – Occurs on clay bluffs near Lake Superior, in cold northern fens, and on calcareous sandy or gravelly borrow or gravel pits. Blooming occurs from early August through mid-September. Species surveyed in Douglas County, Wisconsin between MP 1085 and MP 1097.	Not likely to adversely affect
Arrowleaf sweet coltsfoot *(Petasites sagittatus)*		WI/T	Douglas/WI	Emergent aquatic – Occurs in low, cold marshes and swamp openings, often in large clones. Blooms throughout May. Identifiable mid-May to late August.	Not likely to adversely affect
Western prairie fringed orchid *(Platanthera praeclara)*	T	ND/SC, MN/T	Kittson, Pennington, Polk, Red Lake/MN	Native prairie – Occurs in mesic-wet tall-grass prairie, herbaceous wetlands, and dune complexes. Blooms May to August. Reported east of the right-of-way in Kittson County, Minnesota.	Not likely to adversely affect
Seaside crowsfoot *(Ranunculus cymbalaria)*		WI/T	Douglas/WI	Emergent aquatic – Occurs in brackish or alkaline areas; sandy or muddy shores; and marshes, ditches, and harbors along Lake Michigan or salted roadsides near Superior, Wisconsin. Blooms early June through late August. Identifiable early June to late August. Species surveyed in Douglas County, Wisconsin between MP 1085 and MP 1097.	Not likely to adversely affect
Small yellow water crowfoot *(Ranunculus gmelinii var. hookeri)*		WI/E	Douglas/WI	Emergent aquatic – Occurs in water in cold brooks and springs and in shallow water and muddy shores of ditches, streams, and lakes. Blooms mid-June through late August. Identifiable mid-June to mid-September.	Not likely to adversely affect
Red saltwort (*Salicornia rubra*)		MN/T	Kittson/MN	Native prairie – Occurs on salt flats and margins of alkaline lakes, herbaceous annual. Flowers late July into August, most conspicuous in late summer to autumn when stems turn scarlet.	Not likely to adversely affect
Tea-leaved willow *(Salix planifolia)*		WI/T	Douglas/WI	Emergent aquatic – Occurs on bedrock shoreline in Apostle Islands or along Lake Superior. Blooms throughout May. Identifiable early June to mid-September.	Not likely to adversely affect

TABLE 4.8.2-1 (continued)
State-Listed Threatened and Endangered Species Potentially Occurring along the Alberta Clipper Route

Species	Federal Status	State and Tribal Status [a]	Counties/State	Preferred Habitat	Preliminary Determination
Plants (continued)					
Gray ragwort (*Senecio canus*)		MN/E	Marshall, Polk/MN	Native prairie – Occurs in dry prairie and semiarid habitats. Blooms May to June.	Not likely to adversely affect
Clustered/Northern bur-reed *(Sparganium glomeratum)*		MN/SC, WI/T, LLBO/T	Cass, Carlton/MN, Douglas/WI	Emergent aquatic – Occurs in shallow water of marshes, bogs, cold ditches, and pools in sedge meadows and willow-alder thickets, and occasionally tamarack stands on Lake Superior clay plain. Blooms mid-June through late July. Identifiable early July to mid-September. Several populations documented between MP 962 and MP 984 in Cass County, Minnesota and MP 1065 to MP 1068 in Carlton County, Minnesota. Species surveyed in Douglas County, Wisconsin between MP 1085 and MP 1097.	Not likely to adversely affect

C = Candidate.
D = Delisted (removed from federal listing of threatened or endangered species).
E = Endangered.
SC = Species of conservation concern.
T = Threatened.

[a] Species designated as E, T, or SC by North Dakota (ND), Minnesota (MN), Wisconsin (WI), and the Leech Lake Band of Ojibwe (LLBO) tribe that potentially occur in counties crossed by the Alberta Clipper Project. The Fond du Lac Band adopts the Minnesota State lists.

Sources: MDNR 2006, 2008c; MNR 2008a, 2008b, 2008c; NDGFD 2006a; WDNR 2007; FWS 2006a, 2006b, 2008b; FDL 2007; LLBO 2008.

4.8.2.2 Cerulean Warbler

Background

The cerulean warbler is state-listed as threatened in Wisconsin and as a species of conservation concern in Minnesota. This species has shown range-wide population declines. In Wisconsin, cerulean warblers are rare migrant and summer residents. This warbler nests in large tracts of deciduous forests—especially extensive mature upland and floodplain forests—where they breed from early to mid-May until August.

Impact Assessment

WDNR has indicated that the cerulean warbler and their habitats could be impacted by the proposed Project; however, review of forested habitats crossed by the proposed Project determined that no suitable habitat occurred for this species (Enbridge 2009b).

Mitigation and Monitoring

Although the cerulean warbler is unlikely to nest in the Project area, Enbridge has developed a Migratory Bird Plan (Appendix V), which includes measures to avoid impacts to migratory birds (including the cerulean warbler) by conducting ground surveys within areas to be cleared of vegetation during the nesting season from May 1 to July 31 and providing appropriate protections to all active migratory bird nests identified during the survey, in compliance with the MBTA.

Determination of Effect

Based on an evaluation of the occurrence of the species and protective measures proposed by the Applicant, construction of the Alberta Clipper pipeline would have no effect on the cerulean warbler.

4.8.2.3 Common Tern

Background

The common tern is a common migrant and uncommon resident in Wisconsin that ranges along the Lake Superior shoreline in Douglas County, with a nesting colony located in the Duluth-Superior Harbor. Common terns typically nest on isolated, sparsely vegetated islands or peninsulas in large lakes and feed primarily on small fish. The nesting season is late May through early June, with an average clutch size of three eggs. Primary threats to the species are habitat loss, prolonged inclement weather, nest predation, human disturbance, displacement by gull species, and possibly chemical contaminants (WDNR 2003). The State of Wisconsin has indicated that common terns use a feeding area downstream of the proposed Project in Douglas County.

Impact Assessment

Impacts to the common tern could occur if feeding areas were contaminated downstream from stream crossing in Douglas County, Wisconsin. No impacts would be expected to nesting habitat as no suitable habitat has been identified within the Alberta Clipper Project area.

Mitigation and Monitoring

No common tern nesting habitat has been identified in the vicinity of the proposed Project, and no specific mitigation has been proposed by the Applicant or recommended by the applicable agencies.

Potential impacts would be minimized through the implementation of general wildlife mitigation measures, as discussed in Section 4.6, and Enbridge's SPCC Plan (Appendix E).

Determination of Effect

As the common tern is not expected to nest in the Project area, and impacts to downstream habitats that function as feeding areas would be minimized by the implementation of Enbridge's state-specific EMPs (Appendix C) and its SPCC Plan (Appendix E), the Alberta Clipper Project may affect, but is not likely to adversely affect, the common tern.

4.8.2.4 Blanding's Turtle

Background

The Blanding's turtle is state-listed as threatened in Wisconsin and Minnesota. This turtle historically occurred throughout the northeastern United States and eastern Canada but is now considered imperiled or vulnerable throughout most of its range. Blanding's turtles are semi-aquatic and prefer open, grassy marshes with shallow water. These turtles require 15 to 20 years to reach maturity and mate during early spring. Eggs are deposited in a nest dug in sandy ground up to 1.5 miles from water. Nest sites are reused annually.

Impact Assessment

The proposed Alberta Clipper pipeline could potentially affect the Blanding's turtle and their habitats at riparian crossings in Douglas County, Wisconsin; however, WDNR, in correspondence with Enbridge, stated that no habitat for Blanding's turtle exists in the proposed Project corridor. Blanding's turtles would be affected by construction of the Alberta Clipper pipeline if nesting areas (upland forests with loose or sandy soils next to streams and rivers) were destroyed, or if turtles or their nests were impacted by construction equipment. Compaction of soils due to construction could render nesting habitats unsuitable. Degradation of stream habitats also would affect this turtle.

Mitigation and Monitoring

Enbridge would implement the measures in its state-specific EMPs to minimize impacts to habitats used by the Blanding's turtle. The state-specific EMPs (Appendix C) include measures to:

- Minimize soil compaction by suspending specific construction activities on susceptible soils; conduct compaction testing; and utilize tillage equipment to alleviate compaction, restoring suitable burrowing habitat for small mammals.
- Reseed temporarily cleared areas (rights-of-way and workspaces) to reestablish suitable habitat to bring back temporarily displaced wildlife.
- Minimize tree removal where windbreaks and shelterbelts would be crossed by minimizing the width of the right-of-way necessary for the trench line and vehicle traffic. Fell trees into the right-of-way to minimize damage to off-right-of-way vegetation.
- Install wildlife buffers in riparian habitats by reestablishing suitable woody species to provide cover for wildlife travel corridors in riparian areas.

Determination of Effect

Because the Blanding's turtle is not expected to occur in the Project area and no suitable habitats for the species would be crossed, the proposed Alberta Clipper Project would not affect the Blanding's turtle.

4.8.2.5 Wood Turtle

Background

The wood turtle is state-listed as threatened in Minnesota and Wisconsin. This turtle historically occurred throughout the northeastern United States and eastern Canada, but is now considered imperiled or vulnerable throughout most of its range. In Wisconsin and northern Minnesota, this species is now limited to small, scattered, isolated populations.

Wood turtles live in and along moderate- to fast-flowing streams and rivers. They forage in deciduous forests and open meadows, although they may remain in rivers year-round. Wood turtles can live as long as 60 years. Mating occurs in spring and fall; females dig nests in June on communal gravel sites along streambanks or railroad beds. Wood turtles may occur near proposed waterbody crossings for the Alberta Clipper pipeline in Carlton County, Minnesota; however, no rivers or streams along the proposed route in Wisconsin have potential habitat for wood turtles.

Impact Assessment

The proposed Alberta Clipper pipeline could potentially affect wood turtles and their habitats at riparian crossings in Carlton County, Minnesota where one documented occurrence has been recorded between MP 1063 and MP 1087 (MDNR 2007a). However, the stream and bank conditions at the crossing locations at the Pokegama River and intermittent tributaries in Wisconsin would provide low habitat suitability for the wood turtle, such that this species is not likely to be present within the Project area in Wisconsin (WDNR 2009). Wood turtles would be affected by construction of the Alberta Clipper pipeline if nesting areas (upland forests with loose or sandy soils next to streams and rivers) were destroyed or if turtles or their nests were impacted by construction equipment. Compaction of soils due to construction could render nesting habitats unsuitable. Degradation of stream habitats also would affect this turtle.

Mitigation and Monitoring

Enbridge would implement the measures in its state-specific EMPs to minimize impacts to habitats used by the wood turtle. The state-specific EMPs (Appendix C) include measures to:

- Minimize soil compaction by suspending specific construction activities on susceptible soils; conduct compaction testing; and utilize tillage equipment to alleviate compaction, restoring suitable burrowing habitat for small mammals.
- Reseed temporarily cleared areas (right-of-way and workspaces) to reestablish suitable habitat to bring back temporarily displaced wildlife.
- Minimize tree removal where windbreaks and shelterbelts would be crossed by minimizing the width of the right-of-way necessary for the trench line and vehicle traffic. Fell trees into the right-of-way to minimize damage to off-right-of-way vegetation.
- Install wildlife buffers in riparian habitats by reestablishing suitable woody species to provide cover for wildlife travel corridors in riparian areas.

Determination of Effect

Because the wood turtle is not expected to occur in the Project area and no suitable habitats for the species would be crossed, the Alberta Clipper Project would not affect the wood turtle.

4.8.2.6 Plants

Background

Sixteen state-listed threatened or endangered plants have been noted as potentially occurring in the Alberta Clipper Project right-of-way (Table 4.8.2-1). These plants are associated with native prairies, calcareous fens, emergent wetlands, riparian wetlands, and forested habitats. These habitats have been extensively altered across most of the Project area, primarily by conversion and drainage of land for agricultural production.

Native Prairie

Prairie habitats throughout the Project area have been reduced to remnants, often associated with railroad rights-of-way. Two state-listed plants, the threatened red saltwort and the endangered gray ragwort, were identified as potentially occurring within the Alberta Clipper Project area. The red saltwort was documented at a remnant prairie at MP 816 that would be crossed by the Alberta Clipper pipeline. This plant is widespread in distribution, but because it is a salt-loving species that generally occurs on salt flats and around the margins of alkaline lakes, its distribution is local and sporadic. Habitat for this species is uncommon in Minnesota, although there have been seven records of this species in Kittson County, Minnesota. The gray ragwort, once considered extirpated from the state, has been rediscovered in Marshall and Polk Counties, Minnesota, in three locations. This plant is a small yellow flowering plant that occurs in dry prairie habitats and was not documented within habitats crossed by the Alberta Clipper Project.

Grape Ferns and Moonworts (Botrychium*)*

There are 30 species of these small ferns in North America in the genus *Botrychium* – grape-ferns and moonworts. They are small and generally rare, reproducing through spores located on fertile fronds. Three species, pale moonwort, triangle moonwort, and St. Lawrence grape-fern, are state-listed as endangered or threatened and occur within the Alberta Clipper Project area in Cass County, Minnesota.

The pale moonwort is distinguished by leaflets that are folded longitudinally and are a pale green to whitish color. Both the pale moonwort and the triangle moonwort occur in mesic hardwood forests. The pale moonwort and the St. Lawrence grape-fern are generally considered associated with fire-dependent forest habitats. These unusual plants produce a single leaf and may not produce leaves annually but may skip years. Moonworts are supported by extensive root systems such that removal of the aboveground leaf does not appear to affect the emergence of the plant in subsequent years. Some moonworts have been shown to reproduce vegetatively.

Identification of rare moonworts within the right-of-way during pipeline construction of an existing collocated pipeline led to development of a post-construction monitoring plan, including experimental treatments, transplantation and soil segregation, and annual monitoring of 47 permanent study plots for growth and shading. In addition, a *Botrychium* Avoidance and Monitoring Plan (BAMP) was developed to continue Enbridge's previous post-construction monitoring and management efforts (Enbridge 2009a). Potential threats to *Botrychium* include exotic weed invasion, herbicide applications, soil compaction, and burial by surface deposition.

Calcareous Fen Wetlands

Calcareous fen wetlands are designated as Outstanding Resource Value Waters by MDNR and are given special protection through Minnesota Rules and statutes, which state that these resources may not be filled, drained, or otherwise degraded, wholly or partially, by any activity except as provided for in a management plan approved by MDNR. Calcareous fens result from the upwelling of groundwater through calcareous substrates such as limestone or dolomite. Impacts to groundwater hydrology in the vicinity of the fen have the potential to degrade these habitats. The sterile sedge, a state-listed threatened plant, is associated with calcareous fen wetlands in the Alberta Clipper Project area.

Emergent and Riparian Wetlands

Emergent and riparian wetlands occur in depressions, marshes, and lake edges; along river and stream edges; and within the channels of small slow-flowing streams. Emergent communities are sustained by permanent standing water and are dominated by robust emergent macrophytes, either in pure stands of single species or in mixed stands with multiple species. The dominant plants include cattails, bulrushes, reeds, water-plantains, arrowheads, and spikerushes. These habitats support threatened or endangered plants in Wisconsin: arrowleaf sweet coltsfoot, clustered bur-reed, floating marsh marigold, marsh grass-of-parnassus, seaside crowfoot, slender spike rush, and small yellow water crowfoot. The tea-leaved willow is a perennial shrub that is associated with wetlands known to occur in riparian habitats in Douglas County, Wisconsin. Wetlands, bogs, and lowland forest habitats support the threatened ram's head lady's slipper in Cass County, Minnesota.

Impact Assessment

Rare plant surveys have been completed for portions of the proposed route north of Clearbrook, Minnesota, where required; as well as for the 13 miles of proposed right-of-way in Douglas County, Wisconsin for wetland-dependent rare plants. The results of these surveys are provided in Table 4.8.2-3. The Alberta Clipper Project could adversely affect state-listed plants by:

- Temporary and permanent modification of vegetation community composition and structure from clearing and operational maintenance;
- Increased risk of soil erosion from lack of vegetative cover;
- Expansion of invasive and noxious weed populations along the pipeline right-of-way from construction and operational vegetation maintenance;
- Loss of plant species and habitats from construction clearing and grading;
- Soil and sod disturbance (mixing of topsoil with subsoil, with altered biological activities and chemical conditions that could affect reestablishment and natural recruitment of listed plant species after restoration);
- Compaction and rutting of soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns, inhibiting seed germination, or increasing siltation; and
- Alteration in vegetation productivity and phenology because of increased subsurface soil temperatures associated with heat loss from the pipeline.

TABLE 4.8.2-3 Sensitive Plant Habitats Potentially Affected along the Alberta Clipper Project Route					
Milepost	**State**	**County**	**Habitat Quality and Occurrence**	**Summary**	**Mitigation/Notes[a]**
816 – 817	Minnesota	Kittson	Mesic prairie remnant	Remnant prairie fragment within railroad right-of-way, including red saltwort (T) and nuttall's alkaligrass (*Puccinellia nuttalliana*)	Use of bore crossing would avoid impacts to the prairie.
844	Minnesota	Marshall	Wet brush-prairie	Native plant community including white lady slipper (SC) transplanted for Enbridge's LSr Project	The proposed pipeline would be downgradient of the prairie.
845	Minnesota	Marshall	State-listed calcareous fen	Sterile sedge (T) transplanted for Enbridge's LSr Project, second population avoided	The proposed pipeline would be downgradient of the fen.
847	Minnesota	Marshall	Rare plants	Obtuse (blunt) sedge *(Carex obtusata)* (SC), no habitat within Project right-of-way	No habitat, species not likely to occur.
853.1 – 853.4	Minnesota	Pennington	Mixed cattail marsh	High-quality native plant community, rare plants	Downgradient pipeline crossover to avoid impacts to fen and minimize impacts to cattail marsh.
853.5 - 853.8	Minnesota	Pennington	State-listed calcareous fen, Site of Outstanding Biodiversity Significance	High-quality native plant community, rare plants	Downgradient pipeline crossover to avoid impacts.
886 – 890	Minnesota	Red Lake	Mesic/wet prairie remnants	Remnant native prairie communities within railroad right-of-way	Use of bore crossing would avoid impacts to the prairie.

TABLE 4.8.2-3 (continued)
Sensitive Plant Habitats Potentially Affected along the Alberta Clipper Project Route

Milepost	State	County	Habitat Quality and Occurrence	Summary	Mitigation/Notes[a]
893	Minnesota	Polk	Calcareous fen-like area	High-quality native plant community, rare plants *including Rhynchospora capillacea* (T), *Eleocharis rostellata* (T), and *Eleocharis quinqueflora* (SC)	Fen-like area would be avoided by a downgradient re-route. Consultation with Minnesota Department of Natural Resources is ongoing with regard to the occurrence of threatened plants – proposed transplantation or offsite compensatory mitigation. [b]
954.0 – 954.5	Minnesota	Cass	Rare plants	*Botrychium* species occur outside of the construction right-of-way	Enbridge would fence off to avoid accidental construction impacts. Enbridge would continue to monitor this location for 5 years post-construction.
957.6	Minnesota	Cass	Rare plants	*Botrychium* species occur outside of the construction right-of-way	Enbridge would fence off to avoid accidental construction impacts.
959.5	Minnesota	Cass	Rare plants	*Botrychium* species occur outside of the construction right-of-way	Enbridge would fence off to avoid accidental construction impacts.
962 – 963	Minnesota	Cass	Rare plants	Clustered bur-reed (SC)	Enbridge is developing a rare plant mitigation plan for the Chippewa National Forest (CNF).
963.8 – 963.9	Minnesota	Cass	Rare plants	Clustered bur-reed (SC) and *Botrychium* species	Development of a rare plant mitigation plan for the clustered bur-reed in the CNF. Narrowing of the right-of-way to avoid impacts to *Botrychium* species.
965.4	Minnesota	Cass	Rare plants	Clustered bur-reed (SC) and *Botrychium* species	Enbridge plans to narrow the construction right-of-way to avoid impacting plants. Enbridge is developing a rare plant mitigation plan for the CNF.

TABLE 4.8.2-3 (continued)
Sensitive Plant Habitats Potentially Affected along the Alberta Clipper Project Route

Milepost	State	County	Habitat Quality and Occurrence	Summary	Mitigation/Notes[a]
968.4 – 969.2	Minnesota	Cass	Rare plants	Clustered bur-reed (SC) and *Botrychium* species	Development of a rare plant mitigation plan for the clustered bur-reed in the CNF. Narrowing of the right-of-way to avoid impacts to *Botrychium* species.
972	Minnesota	Cass	Rare plants	Clustered bur-reed (SC)	Enbridge is developing a rare plant mitigation plan for the CNF.
975	Minnesota	Cass	Rare plants	Lapland buttercup (SC)	Enbridge is developing a rare plant mitigation plan for the CNF.
977 – 982	Minnesota	Cass	Rare plants	Clustered bur-reed (SC)	Enbridge is developing a rare plant mitigation plan for the CNF.
982.1 – 984	Minnesota	Cass	Rare plants	Clustered bur-reed (SC) and an individual *Botrychium* species	Development of a rare plant mitigation plan for the clustered bur-reed in the CNF. Narrowing of the right-of-way to avoid impacts to *Botrychium* species.
985.7	Minnesota	Cass	Rare plants	*Botrychium* species occur between horizontal directional drill entry and exit points	No ground disturbance would occur where plants are located. Plants will be fenced to avoid incidental impacts during construction.
986.6	Minnesota	Cass	Rare plants	*Botrychium* species	Enbridge plans to narrow the construction right-of-way to avoid impacting plant.
1054 – 1061	Minnesota	St. Louis	Site of Moderate Biodiversity Significance	Native deciduous forest, coniferous forest, and wetlands	No mitigation is proposed.

TABLE 4.8.2-3 (continued)
Sensitive Plant Habitats Potentially Affected along the Alberta Clipper Project Route

Milepost	State	County	Habitat Quality and Occurrence	Summary	Mitigation/Notes[a]
1061 – 1064	Minnesota	Carlton	Site of Moderate Biodiversity Significance	Native deciduous forest, coniferous forest, and wetlands	No mitigation is proposed.
1065-1068	Minnesota	Carlton	Marsh, beaver channel	Clustered bur-reed (SC)	No mitigation is proposed.
1069-1087	Minnesota	Carlton	Moderate Biodiversity Significance	Native deciduous forest, coniferous forest, and wetlands	No mitigation is proposed.
1087 – 1091	Wisconsin	Douglas	Open forest with springs, wetlands	Clustered bur-reed (T), arrowleaf sweet coltsfoot (T), Vasey's rush (SC)	No mitigation is proposed. [b]
1091.0 – 1092.1	Wisconsin	Douglas	Pokegama Carnegie State Natural Area (SNA)/Area of Special Natural Resource Interest (ASNRI)	Arrowleaf sweet coltsfoot (T)	Neck-down to minimize the width of new right-of-way to 10 feet through the area. Enbridge developed a Construction, Restoration, and Maintenance (CRM) Plan for this area (Appendix T). [b]
1092.1 – 1094.4	Wisconsin	Douglas	Pokegama Carnegie SNA/ASNRI	Arrowleaf sweet coltsfoot (T), seaside crowfoot (T), marsh grass-of-parnassus (T), and Vasey's rush (SC)	Neck –down to minimize the width of new right-of-way to 10 feet through the area. Enbridge developed a CRM Plan for this area (Appendix T). [b]
1094.4 – 1095.0	Wisconsin	Douglas	Small wetland[a]	Vasey's rush (SC)	No mitigation proposed.
1095.0 – 1096.8	Wisconsin	Douglas	Small wetlands, stream crossing[a]	Vasey's rush (SC) and arrowleaf sweet coltsfoot (T)	No mitigation proposed. [b]
1096.8 – 1096.9	Wisconsin	Douglas	Wetlands, fields[a]	No rare plants found during survey	No mitigation proposed.

TABLE 4.8.2-3 (continued)
Sensitive Plant Habitats Potentially Affected along the Alberta Clipper Project Route

Milepost	State	County	Habitat Quality and Occurrence	Summary	Mitigation/Notes[a]
1096.9 – 1097.5	Wisconsin	Douglas	Small wetlands, stream crossing[a]	Vasey's rush (SC), arrowleaf sweet coltsfoot (T), seaside crowfoot (T), and slender spikerush (E)	No mitigation proposed. [b]
1097.5 – 1098.0	Wisconsin	Douglas	Wetlands next to river[a]	Seaside crowfoot (T)	No mitigation proposed. [b]

E = Endangered.
SC = Species of conservation concern.
T = Threatened.

Note: Authority for common plant names from the USDA Natural Resources Conservation Service Plants Database (USDA 2008). All *Botrychium* species locations occur within the Chippewa National Forest and/or Leech Lake Reservation.

[a] Mitigation is not required for state-listed species of concern (SC).
[b] Impacts to state-listed threatened or endangered plants would require take permits from the applicable agency.
[b] Superior Airport/Hill Avenue/South Superior Triangle Area of Special Natural Resource Interest.

Sources: Enbridge 2009a (Appendix T), NRG 2009.

Native Prairie

The Alberta Clipper pipeline would cross approximately 5 miles of remnant prairie habitats with the potential to contain native plant communities and rare plants (Table 4.8.2-3). Of the 5 miles of remnant prairie habitats, 98 percent would be crossed using directional bore and the remainder would be crossed downgradient from the prairie habitat (Table 4.8.2-3). One of the remnant prairie habitats has been documented to contain the red saltwort, which is state-listed in Minnesota**.** This area would be crossed using a directional bore that would leave habitat for this species intact and undisturbed (Table 4.8.2-3).

Calcareous Fen Wetlands

The Alberta Clipper pipeline would be adjacent to approximately 0.3 mile of calcareous fen and fen-like habitats in three locations, with the potential to contain native plant communities and rare plants (Table 4.8.2-3). One of the three crossing sites has been documented to contain the state-listed threatened sterile sedge. Each of the three areas would be avoided by pipeline re-route, resulting in a downgradient pipeline crossing location in each case; however, sensitive plants associated with the fen-like area at MP 893 would still be impacted (Table 4.8.2-3). Potential mitigation for impacts to the rare plants may include transplantation or offsite compensatory mitigation, and Enbridge is in consultation with MDNR (Table 4.8.2-3).

Grape Ferns and Moonworts (Botrychium)

Expansion of the existing Enbridge right-of-way during 2001–2002 resulted in the pipeline impacting locations occupied by moonworts that are protected by Minnesota law. A take permit and mitigation project were developed that included transplantation of protected moonworts. Findings of this mitigation project after 5 years of monitoring indicate that moonworts exhibit large annual variation in population size. Current trends show an overall decline in abundance; because life cycles span years to decades, natural trends are difficult to distinguish from anthropogenic effects (Johnson-Groh 2007).

The Alberta Clipper pipeline would cross 6.8 miles in Cass and Carlton Counties, Minnesota where rare moonworts (*Botrychium* spp.) have been reported to occur (Table 4.8.2-3). Recent surveys across the Enbridge right-of-way in Cass County, Minnesota documented nine occurrences of *Botrychium* species in the Project area including the state-listed endangered pale moonwort and the threatened St. Lawrence grape-fern; each of the nine sites would be avoided during construction (see Table 4.8.2-3) (Enbridge 2009a).

Emergent and Riparian Wetlands

The Alberta Clipper pipeline would cross 49.6 miles of emergent and riparian wetlands and associated native forest habitats with the potential to contain native plant communities and rare plants (Table 4.8.2-3). Of these 49.6 miles, 10.3 miles have been determined to contain habitats that support state-listed threatened arrowleaf sweet coltsfoot, seaside crowsfoot, or the endangered slender spikerush (Table 4.8.2-3). The major risk to wetland-dependent rare plants is alteration of existing hydrology, caused by significantly draining or decreasing the water level. Implementing BMPs should minimize the potential for hydrologic alteration in wetlands. Of the areas identified as containing state-listed threatened or endangered plants, 60 percent would be avoided or mitigated as described in Table 4.8.2-3. For state-listed threatened or endangered plants that may be destroyed during construction on state-owned lands, landowner notification and a take permit would be required.

Mitigation and Monitoring

Measures to reduce impacts to vegetation described in Enbridge's state-specific EMPs (Appendix C) and Revegetation and Restoration Monitoring Plans (Appendix K) are described in Sections 4.5.6.1 and 4.5.6.2. Enbridge has developed site-specific avoidance measures, as described in Table 4.8.2-3, to protect sensitive vegetation communities, including:

- Directional bore for pipeline installation beneath mesic prairie remnants;
- Route modifications, pipeline crossovers, and narrowing of the construction right-of-way to avoid rare plants;
- Fencing off rare plants to avoid accidental construction impacts;
- Temporary removal of rare sedges in blocks of sod, holding and subsequent replanting; and
- Post-construction restoration of rare wetland plants in the Pokegama Carnegie Wetlands SNA/ASNRI, likely to include options such as:
    - Fine grading to recreate micro-topographic depressions;
    - Reconnecting drainageways and swales;
    - Limiting seeding to an annual cover crop that would not compete with reestablishment of rare plants;
    - conducting onsite seed collection for reseeding after completion of fine grading activities; and
    - identifying potential special seed mixes.

Subject to approval by MDNR, Enbridge would implement its BAMP (Enbridge 2009a). The BAMP addresses how Enbridge proposes to avoid or mitigate impacts to *Botrychium* within the 47 experimental treatment plots and at locations identified during surveys completed during 2007 and 2008 (Table 4.8.2-3). Enbridge plans to avoid or modify construction areas at all locations with identified *Botrychium* populations; no transplantation of *Botrychium* plants would occur. Post-construction monitoring of all *Botrychium* plants relocated during construction of the Terrace III Pipeline Expansion Project and within the existing experimental plots was revised and improved upon, and will continue for an additional 5 years (Enbridge 2009a).

Subject to approval by WDNR, Enbridge would implement its Pokegama CRM Plan for the Pokegama Carnegie Wetlands SNA/ASNRI (Appendix T). The Pokegama CRM Plan addresses how Enbridge proposes to avoid or minimize impacts to rare plants and actively restore unavoidable impacts. No mitigation has been proposed for the Superior Airport/Hill Avenue/South Superior Triangle ASNRI, as the original route was designed to minimize impacts.

Determination of Effect

Based on an evaluation of the occurrence of state-listed plant species and avoidance and protective measures proposed by the Applicant (Table 4.8.2-3), pipeline construction may affect populations of state-listed plants at a calcareous fen-like area near MP 893, within the Pokegama Carnegie Wetlands SNA/ASNRI near MP 1091 to MP 1094, and at the Superior Airport/Hill Avenue/South Superior Triangle ASNRI at MP 1094 to MP 1098. Impacts to state-listed threatened and endangered plants in each of these three areas would require a take permit from the applicable state agency. Enbridge began informal discussions with MDNR on March 19, 2009 regarding a Take Permit Application for the two state-listed species that occur near MP 893. In addition, Enbridge would need to acquire take permits from WDNR – Bureau of Endangered Resources for impact to the 11 occurrences of state-listed

threatened or endangered plants that occur within the Pokegama Carnegie Wetlands SNA/ASNRI and the Superior Airport/Hill Avenue/South Superior Triangle ASNRI in Douglas County, Wisconsin.

Comparison of rare plant communities after construction of the Terrace III Pipeline indicate that state-listed plants successfully regenerated and some populations expanded after construction, although a few populations decreased in size (Appendix T). Construction of the Alberta Clipper pipeline may affect, but is not likely to adversely affect, the continued existence of state-listed plants at the locations identified in Table 4.8.2-3.

4.8.3 Tribally Designated Threatened, Endangered, and Sensitive Species

LLBO regulates threatened, endangered, and sensitive species through the Leech Lake Conservation Code Chapter III, General Offences Section 1, which prohibits the take (or assistance in a take), possession, or transport of any wild animal, fish, or plant that has been determined to be a Sensitive, Threatened, or Endangered species by the Leech Lake Division of Resource Management or FWS. To assess and evaluate impacts to CNF- and LLBO-regulated species, a biological evaluation of the proposed Alberta Clipper Project was completed and is included in Appendix W. A summary of the analyses and determination of Project-related effects for LLBO-listed species is presented in Table 4.8.3-1. For evaluation of CNF-regulated Regional Forester Sensitive Species, the reader is referred to Appendix W.

The proposed Alberta Clipper Project would cross lands within the FDL Reservation in Carlton and St. Louis Counties in Minnesota. The FDL has requested that this EIS assess Canada lynx, gray wolf, peregrine falcon, mountain lion, and bald eagle. Canada lynx (federally-listed) and gray wolf (recently delisted) are discussed in Sections 4.8.1.3 and 4.8.1.4, respectively. Because peregrine falcon is state-listed as threatened (Minnesota), it is discussed in Section 4.8.2.1. Mountain lion and bald eagle are discussed in Section 4.8.4 because they are state species of concern (Minnesota).

4.8.4 State-Listed Sensitive Species

Sensitive species are animals and plants of conservation concern (defined as conservation priority by North Dakota, special concern species by Minnesota and Wisconsin, or sensitive species by the CNF Regional Forester and LLBO). During consultations with state resource agencies, review of habitat and survey data, 14 sensitive wildlife species were either documented or identified as likely to occur along the Project right-of-way, including six birds, two mammals, one insect, two fish, and three mussels (Table 4.8.4-1). Nineteen sensitive plants were identified during consultations with state resource agencies, and review of habitat and survey data as occurring or likely to occur along the Project right-of-way (Table 4.8.4-1). Additional species of conservation concern may occur along the proposed Project route and may be impacted by construction activities. Enbridge's state-specific EMPs (Appendix C) would minimize impacts to species of conservation concern. Migratory birds (many of which are considered to be state species of concern) are discussed in Section 4.6.

4.8.4.1 Sensitive Birds

Background

Bald Eagle

Historically, populations of bald eagles were drastically reduced by low productivity caused by the bioaccumulation of pesticides. Since organochlorine pesticides such as DDT have been banned, bald eagle numbers have been increasing—leading to the species being removed from the federal list of

TABLE 4.8.3-1
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Birds							
American bittern (*Botaurus lentiginosus*)		Yes	Yes	S	Sedge/cattail wetlands.	Negligible	No effect
American white pelican (*Pelecanus erythrorhynchos*)		No	No	S	Large, shallow bodies of water that are rich in fish, in both treeless and forested country. Nesting site usually a flat, bare island isolated from humans.	No effect	
Bald eagle (*Haliaeetus leucocephalus*)	D	Yes	Yes	T	Nests and roosts in large trees near rivers or lakes. Breeds February to August. Nests and roosting habitats identified along the Alberta Clipper Project right-of-way.	Negligible	No effect
Bay-breasted warbler (*Dendroica castanea*)		Yes	No	S	Upland and lowland spruce/fir forests.	Negligible	No effect
Black-backed woodpecker (*Picoides arcticus*)		Yes	Yes	T	Mature coniferous forests with snags. Areas with wood-boring beetle larvae. One sighting reported in Chippewa National Forest.	Negligible	No effect
Black tern (*Chlidonias niger*)		Yes	Yes	S	Floating aquatic vegetation mat around lakes.	Negligible	No effect
Black-throated blue warbler (*Dendroica caerulescens*)		Yes	No	S	Large, contiguous mature forests; probably associated with small gaps and a well developed shrub understory.	Negligible	No effect
Common tern (*Sterna hirundo*)		No	No	T	Sparsely vegetated islands in large lakes. One known nesting location on Leech Lake Reservation.	No effect	
Connecticut warbler (*Oporornis agilis*)		Yes	Yes	S	Jack pine or lowland conifer with a thick ericaceous (heath) understory. Occurs in many other habitats.	Negligible	No effect
Forster's tern (*Sterna forsteri*)		No	No	S	Large marshes with extensive areas of emergent vegetation.	No effect	
Franklin's gull (*Larus pipixcan*)		No	No	S	Nests in freshwater marshes, shores of inland lakes, in prairies and grasslands.	No effect	
Great blue heron (*Ardea herodias*)		Yes	Yes	S	River, lake edges, marshes, swamps, and mature forests or woodlots.	Negligible	No effect
Great gray owl (*Strix nebulosa*)		Yes	Yes	T	Mature black ash, black spruce, tamarack forest on wet soil near open foraging areas. Several known active nest locations on Leech Lake Reservation.	Negligible	No effect
Henslow's sparrow (*Ammodramus henslowii*)		No	No	E	Potential nesting habitat in tall grasslands, meadows, and abandoned fields with wet areas.	No effect	

TABLE 4.8.3-1 (continued)
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Birds (continued)							
Herring gull (*Larus argentatus*)		No	No	T	Beaches, fields, inland lakes, reservoirs, and rivers. One small colony with approximately 12 nesting pairs on Leech Lake Reservation.	No effect	
Horned grebe (*Podiceps auritis*)		Yes	No	T	Marshes, lakes, and ponds; usually nests among tall vegetation in shallow water.	Negligible	No effect
King rail (*Rallus elegans*)		Yes	No	E	Prefers shallow marsh habitats; nesting habitats include wetlands with abundant grasses, sedges, rushes, and cattails.	Negligible	No effect
LeConte's sparrow (*Ammodramus leconteii*)		Yes	Yes	S	Level lowlands and uplands with dense, tall, grass/sedge vegetation and thick ground litter.	Negligible	No effect
Northern goshawk (*Accipiter gentiles*)		Yes	Yes	E	Large tracts of older trees with closed canopy and open understory.	Negligible	No effect
Osprey (*Pandion halietus*)		Yes	Yes	S	Lakes and rivers with adequate supplies of fish.	Negligible	No effect
Piping plover (*Charadrius melodus*)	E	No	No	E	Suitable habitats in open sandy areas, saline flats, sandbars, and sand and gravel beaches along rivers and gravel pits. Breeds April to September.	No effect	
Red-shouldered hawk (*Buteo lineatus*)		Yes	Yes	T	Prefers riparian woodlands, wetlands, and large blocks of old-growth forests for nesting.	Negligible	No effect
Sandhill crane (*Grus canadensis*)		Yes	No	S	Large open fields, sedge meadows, and shallow wetlands.	Negligible	No effect
Short-eared owl (*Asio flammeus*)		Yes	No	S	Large grasslands, marshes, open peatlands, and fields.	Negligible	No effect
Trumpeter swan (*Cygnus buccinator*)		Yes	Yes	E	Small ponds and lakes or bays with extensive beds of cattails, bullrushes, sedges, and/or horsetail. Known pair on Leech Lake Reservation.	Negligible	No effect
Wilson's phalarope (*Phalaropus tricolor*)		Yes	No	S	Vernal ponds, small ponds, and large open wet meadows.	Negligible	No effect
Yellow rail (*Coturnicops noveboracensis*)		No	No	T	Prefers herbaceous wetlands, fen, riparian, and wet meadows.	No effect	

TABLE 4.8.3-1 (continued)
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Mammals							
Canada lynx (*Lynx canadensis*)	T	Yes	No	E	Variety of habitats, adequate prey, low human disturbance.	Negligible	No effect
Mountain lion [Cougar/Puma] (*Puma* [*Felis*] *concolor*)		Yes	No	E	Broad spectrum of habitats with abundant prey. Dens among rocks or dense vegetation. Breeds April to September.	Negligible	No effect
Franklins' ground squirrel (*Spermophilus franklinii*)		Yes	Yes	S	Densely vegetated areas, often the transition between wood and grassland.	Negligible	No effect
Gray wolf (*Canis lupus*)	D	Yes	Yes	S	Large tracts of wildland with adequate prey (deer, moose, beaver) and low human disturbance.	Negligible	No effect
Heather vole (*Phenacomys intermedius*)		Yes	No	S	Coniferous forests, forest borders, heath shrublands, willow thickets, rocky hillsides, and moist meadows.	Negligible	No effect
Northern bog lemming (*Synaptomys borealis*)		No	No	S	Forests, brushland, or clearcuts with *Vaccinium* spp. and rocks.	No effect	
Northern myotis (*Myotis septentrionalis*)		Yes	No	S	Caves in winter, forested and riparian habitats in summer; roosts in snags/hollow trees under bark.	Negligible	No effect
Pine martin (*Martes americana*)		Yes	No	S	Coniferous forests.	Negligible	No effect
Prairie vole (*Microtus ochrogaster*)		No	No	S	Dry upland prairie, occasionally jack pine woods.	No effect	
Amphibians							
Four-toed salamander (*Hemidactylium scutatus*)		Yes	No	S	Adults live under or among sphagnum mosses in swamps, boggy streams, and wet wooded or open areas near ponds or quiet, mossy, or grassy/sedge dominated pools.	Negligible	No effect
Green frog (*Rana clamitans*)		Yes	No	S	Habitats surrounding inland waters.	Negligible	No effect
Red-backed salamander (*Plethodon cinerus*)		Yes	No	S	Deciduous woods with thick leaf litter and many decaying logs or stumps.	Negligible	No effect
Reptiles							
Blanding's turtle (*Emydoidea blandingii*)		Yes	No	T	Upland and lowland habitats with suitable shade and insects for forage. Riparian habitats with open sandy areas for nesting.	Negligible	No effect

TABLE 4.8.3-1 (continued)
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Reptiles (continued)							
Eastern hognose snake (*Heterodon platirhinos*)		Yes	No	S	Open sandy woodlands.	Negligible	No effect
Snapping turtle (*Chelydra serpentine*)		Yes	Yes	S	All aquatic habitats, especially soft mud bottoms, aquatic vegetation, or submerged brush and logs.	Negligible	No effect
Fish							
Greater redhorse (*Moxostoma valeniennesi*)		Yes	Yes	S	Large lakes and rivers in the Hudson Bay drainage of the Chippewa National Forest.	Negligible	No effect
Pugnose shiner (*Notropis anogenus*)		Yes	No	S	Large lakes such as Cass Lake and possibly others.	Negligible	No effect
Mollusks							
Black sandshell (*Ligumia recta*)		Yes	Possible	S	Medium to large rivers.	Negligible	No effect
Creek heelsplitter (*Lasmigona compressa*)		Yes	Possible	S	Headwaters of larger rivers, Mississippi River and tributaries, and Pike Bay channel.	Negligible	No effect
Plants							
American elm (*Ulmus americana*)		Yes	No	S	Moist soil conditions, especially valleys and floodplains, in mixed hardwood forests.	Negligible	No effect
Barren strawberry (*Waldsteinia fragarioides*)		Yes	No	S	Near conifer or oak forest on sandy soils.	Negligible	No effect
Bitternut hickory (*Carya cordiformis*)		Yes	No	S	Well-drained floodplains and moist upland forests.	Negligible	No effect
Blue beech/Musclewood (*Carpinus caroliniana*)		Yes	Yes	S	Eastern mixed hardwood forests; hardwood swamps on mineral soils or muck; rich, wet-mesic sites.	May affect	No effect
Blunt-lobed grape-fern (*Botrychium oneidense*)		Yes	No	E	Northern hardwoods, especially near ephemeral pools.	Negligible	No effect
Bog adder's-mouth (*Malaxis paludosa*)		Yes	No	E	Lowland conifer.	Negligible	No effect
Butternut (*Juglands cinerea*)		Yes	No	S	Northern hardwoods.	Negligible	No effect
Canada yew (*Taxus canadensis*)		Yes	Yes	S	Rich mixed forest; banks of ravines; wide variety of forests, swamps, and uplands.	May affect	No effect

TABLE 4.8.3-1 (continued)
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Plants (continued)							
Club-spur orchid (*Platanthera clavellata*)		Yes	No	T	Bog mats, sphagnum, stunted conifer swamp, mixed spruce tamarack. Sandy wet depressions in jack pine barrens.	Negligible	No effect
Clustered [Northern] bur-reed (*Sparganium glomeratum*)		Yes	Yes	T	Sedge meadow and shallow marsh, floating bog mats, and emergent wetlands.	May affect	No effect
Dissected grape-fern (*Botrychium dissectum*)		Yes	Yes	T	Bottoms, ravines, dry woods, brushy areas, and paths.	May affect	No effect
Dragon's mouth orchid (*Arethusa bulbosa*)		Yes	Yes	S	Sphagnum bogs and swamps.	Negligible	No effect
Fairly slipper (*Calypso bulbosa*)		Yes	No	T	Lowland coniferous forest; white pine or cedar lowland; cool, mossy, heavily shaded cedar swamps.	Negligible	No effect
Few-flowered spike-rush (*Eleocharis quinqueflora*)		Yes	No	S	Bogs, lakes, streams, and shorelines.	Negligible	No effect
Goblin fern (*Botrychium mormo*)		Yes	Yes	E	Mesic deciduous forest with thick leaf layer, open understory.	Negligible	No effect
Goldie's fern (*Dryopteris goldiana*)		Yes	No	T	Northern hardwoods, lowland hardwoods.	Negligible	No effect
Hackberry (*Celtis occidentalis*)		Yes	No	S	Floodplain, lakeshore, and mesic upland forests.	Negligible	No effect
Hiddenfruit bladderwort (*Utricularia geminiscapa*)		Yes	Yes	T	Occurs in moss/sedge of small pools and acid bogs. Recent population reported on Leech Lake Reservation.	No effect	No effect
Humped bladderwort (*Utricularia gibba*)		Yes	Yes	S	Exposed shores, lakes, ponds, rivers, streams, marshes, and fens.	Negligible	No effect
Lance-leaved grape-fern [Triangle moonwort] (*Botrychium lanceolatum*)		Yes	Yes	T	Shaded woods, hardwood uplands, and lowlands.	May affect	No effect
Lapland buttercup (*Ranunculus lapponicus*)		Yes	Yes	T	Moss hummocks in lowland conifer swamps.	May affect	No effect
Least moonwort (*Botrychium simplex*)		Yes	Yes	T	Northern hardwoods, open areas, and moist places.	May affect	No effect
Limestone oak fern (*Gymnocarpium robertianum*)		Yes	No	S	Lowland conifer.	Negligible	No effect

TABLE 4.8.3-1 (continued)
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Plants (continued)							
Mingan [Island] moonwort (*Botrychium minganense*)		Yes	Yes	T	Northern hardwoods.	May affect	No effect
New England violet (*Viola novae-angliae*)		Yes	Yes	S	Dry-mesic forests.	May affect	No effect
Olivaceous spike-rush (*Eleocharis olivacea*)		Yes	No	T	Bogs, lakes, streams, and shorelines.	Negligible	No effect
One-flowered broom-rape (*Orobanche uniflora*)		Yes	No	T	Northern hardwoods, lowland conifers, and upland/lowland transitions.	Negligible	No effect
Pale moonwort (*Botrychium pallidum*)		Yes	Yes	T	Northern hardwoods, open areas, disturbed habitats, log landings, roadsides, dunes, and sandy gravel pits.	May affect	No effect
Partridge-berry (*Mitchella repens*)		Yes	No	S	Dry or moist forest.	Negligible	No effect
Purple bladderwort (*Utricularia purpurea*)		Yes	No	S	Shallow lakes, ponds.	Negligible	No effect
Ram's head ladyslipper (*Cypripedium arietinum*)		Yes	Yes	T	Forest, bogs, acidic bedrock, shorelines-interdunal areas; wide variety of forested habitats.	Negligible	No effect
Slender naiad (*Najas gracillima*)		No	No	S	Soft-water lakes and ponds.	No effect	
Slippery elm (*Ulmus rubra*)		Yes	No	T	Well-drained floodplain forests and moist upland forests.	Negligible	No effect
Spatulate-leaved sundew (*Drosera intermedia*)		Yes	Yes	S	Bogs; fens; and moist, acidic, sandy soils, often in standing water.	May affect	No effect
Sweet fern (*Comptonia peregrine*)		Yes	No	S	Openings in coniferous forest in well-drained dry, acid, sandy, or gravelly soils.	Negligible	No effect
Sweet grass (*Hierchloe odorata*)		Yes	Yes	S	Wet meadow, low prairies, marsh edges, bogs, shaded stream banks, lake shores, and trail edges.	May affect	No effect
Ternate grape-fern (*Botrychium rugulosum*)		Yes	Yes	T	Dry areas with short grass, bracken, sweet fern, jack pine, red pine, aspen/fir, and open areas within these types. Ephemeral pools in pines, spruce, birch/aspen with pH near neutral.	Negligible	No effect
Torrey's manna-grass (*Torreyochloa pallida*)		Yes	No	S	Lowland conifer, lakes, streams, and shoreline.	Negligible	No effect

TABLE 4.8.3-1 (continued)
Evaluation of Leech Lake Band of Ojibwe Designated Threatened, Endangered, and Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	Federal Status	Potential Habitat Present[a]	Species Present[a]	LLBO Status	Habitat Summary	LLBO Determination[b]	
						Individual	Population
Plants (continued)							
White adder's mouth (*Malaxis monophyllos* var. *brachypoda*)		Yes	Yes	T	Lowland hardwoods and conifers.	Negligible	No effect
White pine (*Pinus strobus*)		Yes	Yes	S	Well-drained soils and a cool, humid climate.	May affect	No effect
White trout-lily (*Erythronium albidum*)		No	No	T	Northern hardwoods by large lakes.	No effect	

D = Delisted (removed from federal listing of threatened or endangered species).
E = Endangered.
S = Sensitive.
T = Threatened.

[a] Presence within the Alberta Clipper Project Route (Table 3-1, Appendix W) except for a few plants, only found along the Great Lake Gas Alternative – American elm, one-flowered broom-rape, and Torrey's manna-grass (Appendix W).

[b] Determination for proposed Alberta Clipper Project (Appendix W).
Negligible = Negligible or improbable negative effect on individuals of the species.
May affect = May have a negative effect on individuals.
No effect = Individuals on Leech Lake Band of Ojibwe (LLBO) lands would not be affected. Populations on LLBO lands would not be affected.

Source: GES and NRG 2009 (Appendix W).

TABLE 4.8.4-1
State-Listed Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	State Status and Occurrence by County [a]			Comments
	ND	MN	WI	
Birds				
Bald eagle (*Haliaeetus leucocephalus*)	SC – Pembina	SC – Carlton, Cass, Itasca, Pennington	SC – Douglas	Nests and roosts in large trees near rivers or lakes. Breeds February to August. Nests and roosting habitats identified along the Alberta Clipper Project right-of-way. One sighting at Red Lake River in Thief River Falls, 7 adults sighted within Chippewa National Forest with 11 nest structures sighted between Canadian border and Clearbrook, Minnesota.
Connecticut warbler (*Oporornis agilis*)			SC – Douglas	Prefers mature, multi-layered pine forests, especially jack pine with dense understory. Breeds mid-June through mid-July. Six sightings reported within Chippewa National Forest.
LeConte's sparrow (*Ammodramus leconteii*)	SC – None		SC – Douglas	Uses hummocky alkali fens, tallgrass prairie, wet-meadow zones of wetlands, tame hayfields, and retired cropland. Nests on the ground in dense vegetation and among scattered small willows. Breeds early May through August. Suitable habitat in the vicinity of the proposed Project occurs from MP 1085.0 to MP 1089.2. Three sightings reported within Chippewa National Forest.
Nelson's sharp-tailed sparrow (*Ammodramus nelsoni*)	SC – None	SC – Pennington	SC – None	Nests in freshwater wetlands, lake margins with emergent cattails, native prairie, and idle fields. Breeds late spring through fall.
Upland sandpiper (*Bartramia longicauda*)	SC – None		SC – Douglas	Prefers tall grass prairies, sedge meadows, unmowed alfalfa/ timothy fields, and scattered woodlands. Breeds early May through late September.
Western meadowlark (*Sturnella neglecta*)			SC – Douglas	Prefers open grassland and cropland. Breeds April to mid-July.

TABLE 4.8.4-1 (continued)
State-Listed Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	State Status and Occurrence by County [a] ND	MN	WI	Comments
Mammals				
Mountain lion [Cougar/Puma] (*Puma* [*Felis*] *concolor*)		SC – Carlton. St. Louis	NL – Douglas	Habitat variable, swamps, riparian woodlands. Dens among rocks or dense vegetation. Breeds April to September.
Franklin's ground squirrel (*Spermophilus franklinii*)		NL – Beltrami, Cass, Itasca	SC – Douglas	Prefers brushy and partly wooded areas, marshlands, and prairie edges. Semi-colonial burrowing mammal. Breeds late April to mid-June, active April through September.
Insects				
Forcipate emerald dragonfly (*Somatochlora forcipata*)			SC – Douglas	Prefers small, spring-fed boggy streams. Flight period June through August. WDNR has identified this species in the vicinity of the Pokegama River.
Fish				
American eel (*Anguilla rostrata*)		SC – None	SC – Douglas	Prefers large streams and lakes with muddy bottoms and still waters. Migrates to marine waters for spawning – Missouri and Mississippi River drainages.
Lake sturgeon (*Acipenser fulvescens*)	Extirpated	SC – Carlton, Kittson, Marshall, St. Louis	SC – Douglas	Large rivers and lakes, and gravel substrate; shoal waters of the Great Lakes. Spawns late April through early June.
Mollusk				
Black sandshell mussel (*Ligumia recta*)	SC – None	SC – Pennington, Itasca		Found in medium to large rivers with strong current and coarse sand and gravel with cobble substrates. Larvae parasitic on fish, probably sunfish and perch. Found in several streams on Leech Lake Reservation. Also observed at Red Lake and Lost and Swan Rivers in Minnesota; five sites along pipeline right-of-way surveyed with no sightings.

TABLE 4.8.4-1 (continued) State-Listed Sensitive Species Potentially Occurring along the Alberta Clipper Project Route				
	State Status and Occurrence by County [a]			
Species	**ND**	**MN**	**WI**	**Comments**
Mollusk (continued)				
Creek heelsplitter mussel (*Lasmigona compressa*)	SC – None	SC – Pennington, Red Lake, Polk, Beltrami		Found in variable sizes of rivers and streams and rarely in lakes with gravel, sand, or mud substrates. Found in several streams on Leech Lake Reservation. Also observed at Red Lake and Lost and Swan Rivers in Minnesota; five sites along pipeline right-of-way surveyed with no sightings.
Fluted shell mussel (*Lasmigona costata*)		SC – Pennington		Found in canals, rivers, and lakes with gravel, sand, or mud bottoms. Larvae parasitic on fish, probably shad, suckers, and minnows. Observed at Red Lake and Lost and Swan Rivers in Minnesota; five sites along pipeline right-of-way surveyed with no sightings.
Plants				
Mingan [Island] moonwort (*Botrychium minganense*)		SC – Cass		Grape Fern & Moonwort (*Botrychium*) – Five populations surveyed; three populations between MP 954 and MP 959 and one population each at MP 965 and MP 985.
Least moonwort (*Botrychium simplex*)		SC – Cass		Grape Fern & Moonwort (*Botrychium*) – Occurs sporadically in open fields and shaded places. Leaves appear late spring and early summer.
Slim-stem small reedgrass (*Calamagrostis stricta*)			SC – Douglas	Calcareous fen – Prefers dry to moist dunes, barrens, and dolomite or sandstone ledges, mostly near the Great Lakes and calcareous wetlands. Blooms throughout June.
Crawe sedge (*Carex crawei*)			SC – Douglas	Calcareous fen – Prefers calcareous wetlands and dolomitic pavement, often near Lake Michigan, and also fens and moist calcareous prairies. Blooms from mid-April through late May.
Smooth black sedge (*Carex nigra*)			SC – Douglas	Emergent aquatic – Grows in saturated or seasonally flooded organic soils above red clay. Fruits begin to develop in mid-June and persist through autumn.
Singlespike sedge (*Carex scirpoidea*)		SC – Marshall		Calcareous fen – Occurs in variety of calcareous wetland habitats. Fruiting late May through September.

TABLE 4.8.4-1 (continued) State-Listed Sensitive Species Potentially Occurring along the Alberta Clipper Project Route				
	State Status and Occurrence by County [a]			
Species	**ND**	**MN**	**WI**	**Comments**
Plants (continued)				
Small white lady's slipper (*Cypripedium candidum*)		SC – Marshall, Pennington		Native prairie – Occurs in mesic to wet prairies and fen meadows, rarely on open wooded slopes. Flowers April through July.
Northern yellow lady's slipper (*Cypripedium parviflorum* var. *makasin*)			SC – Douglas	Native prairie – Prefers mesic to wet fens, prairies, meadows, thickets, open coniferous and mixed forest. Flowers from May through August.
Showy lady's slipper (*Cypripedium reginae*)			SC – Douglas	Forests – Prefers neutral to alkaline forested wetlands, rich upland forests in seeps, and moist to dry clay bluffs. Flowers throughout June.
Flat-stemmed spike-rush (*Eleocharis compressa*)			SC – Douglas	Native prairie – Prefers moist to wet, often calcareous prairies and mud flats. Flowers from early May through mid-June.
Marsh horsetail (*Equisetum palustre*)			SC – Douglas	Emergent aquatic – Prefers fens, alder thickets, wet sedge meadow, and bog and swamp margins. Most easily identified from mid-May through late September.
Variegated horsetail (*Equisetum variegatum*)			SC – Douglas	Emergent aquatic – Occurs in wet dolomite flats and gravelly swales near Lake Michigan but can be found in other wet, open, neutral to calcareous wetlands.
Vasey's rush (*Juncus vaseyi*)			SC – Douglas	Emergent aquatic – Prefers cold fens. Blooms mid- to late June or early to late July. Several populations surveyed within Douglas County, Wisconsin (MP 1089 – MP 1097).
Large-flowered ground cherry (*Leucophysalis grandiflora*)			SC – Douglas	Forests – Found in recently burned moist to dry forests, and on gravel bars of large rivers. Blooms throughout July.
Large roundleaf orchid (*Platanthera orbiculata*)			SC – Douglas	Forests – Prefers moist hardwood or mixed conifer-hardwood forests. Blooms from mid-June through late July.
Club-spur orchid *(Platanthera clavellata)*		SC – Carlton		Emergent aquatic – Found in an acid peatland.

TABLE 4.8.4-1 (continued)
State-Listed Sensitive Species Potentially Occurring along the Alberta Clipper Project Route

Species	State Status and Occurrence by County [a] ND	MN	WI	Comments
Plants (continued)				
Lapland buttercup (*Ranunculus lapponicus*)		SC – Cass		Emergent aquatic – One reported occurrence in Cass County, Minnesota (MP 975).
Clustered [Northern] bur-reed (*Sparganium glomeratum*)		SC – Cass, Carlton	T – Douglas	Emergent aquatic – shallow water of marshes, bogs, cold ditches, and pools in sedge meadows.
Common bog arrow-grass (*Triglochin maritima*)			SC – Douglas	Calcareous fen – Prefers muddy to marly fen and bog edges, and calcareous sedge meadows. Blooms throughout July.

NL = Not listed as a conservation concern.

SC = Species of conservation concern.

[a] Species designated as SC by states and reported to occur in counties crossed by the Alberta Clipper Project pipeline right-of-way. Species listed in Douglas County were noted within 2 miles of the proposed Project.

Sources: FWS 2006a, 2006b, 2008b; MDNR 2006, 2007a, 2007b, 2008b, 2008c; WDNR 2007.

threatened species on June 28, 2007. Bald eagles are currently considered sensitive species in each state crossed by the proposed Project and are listed as threatened on the LLR in Minnesota. Eagles and their nests are further protected from destruction and disturbance by the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 688–688d [a and b]). In 2007, FWS developed the National Bald Eagle Management Guidelines. The guidelines are intended for landowners, land managers, and others who share lands with bald eagles to minimize their potential impacts, advising them when and under what circumstances the protective provisions of the BGEPA may apply to their activities (FWS 2007a, 2007c).

Bald eagles use mature, forested, riparian areas near rivers, streams, lakes, wetlands, and reservoirs. They nest, migrate, and winter in all three states and within most of the counties along the Alberta Clipper Project pipeline route. They generally nest from early February through mid-August, and often return to use the same nest and winter roost year after year. The bald eagle's diet consists mostly of fish. Eagles also forage opportunistically on waterfowl, dead fish, jackrabbits, and big game carrion—especially in winter. Southward migration begins as early as October, although the wintering period generally extends from December to March. Bald eagles roost in a forested area known as a communal roost. A communal roost is generally defined as an area where six or more eagles spend the night within 100 meters (about 328 feet) of each other.

Some of the highest densities of nesting bald eagles occur in the Boreal Hardwood Transition (Bird Conservation Region 12) region in Minnesota and Wisconsin that would be crossed by the Alberta Clipper Project (FWS 2007c). Post-delisting monitoring indicates that bald eagles are continuing to increase in abundance and occur within all states crossed by the proposed Alberta Clipper Project. Recent surveys have identified six active bald eagle nests and five inactive bald eagle nests within 0.25 mile of the Alberta Clipper Project route (Table 4.8.4-2).

TABLE 4.8.4-2
Bald Eagle Nest Sites within 0.25 mile (1,320 feet) of the Alberta Clipper Project Route

Milepost	State	County	Activity Observation	Habitat
956	Minnesota	Cass	Inactive nest – May 2008	Aspen stand next to Pikes Bay
962	Minnesota	Cass	Inactive nest – May 2008	Aspen stand next to wetland
967	Minnesota	Cass	Active nest – May 2008	White pine in mixed stand
972	Minnesota	Cass	Inactive nest – May 2008	White pine at edge of wetland complex
977	Minnesota	Cass	Inactive nest – May 2008	White pine in mixed stand
979	Minnesota	Cass	Active nest – May 2008	White pine at Nashkahake
985	Minnesota	Cass	Active nest – May 2008	White pine near Mississippi River
988	Minnesota	Itasca	Active nest – May 2008	White pine in Ball Club
1002	Minnesota	Itasca	Active nest – May 2008	Aspen stand surrounded by wetland
1077	Minnesota	Carlton	Active nest – May 2008	White pine snag near lake
1077	Minnesota	Carlton	Inactive nest – May 2008	White pine on lake shore

Note: As the portion of the route through the Fond du Lac Reservation was recently incorporated into the proposed route, Enbridge will obtain updated National Heritage Inventory data and conduct aerial stick nest surveys for the area.

Sources: GES 2008a, 2008b, 2008c; MDNR 2006; WDNR 2007.

Connecticut Warbler

The Connecticut warbler is a species of conservation concern in Wisconsin and is designated as a sensitive species on the LLR in Minnesota. Connecticut warblers breed throughout northeastern Minnesota and northern Wisconsin. This species has declined regionwide at a rate of about 3 percent per year since the 1980s, although the population breeding in Minnesota appears to have remained stable during this period (Sauer et al. 2007). Declines in the species have been attributed to habitat loss, including the loss of jack pine forests and barrens due to woody encroachment in the absence of fire and cover type conversions to red pine plantations (Kreitinger and Paulios 2007). Jack pine forests have declined by as much as 79 percent, and black spruce and other coniferous lowland forest types have declined by as much as 15 percent throughout the Great Lakes region (Kreitinger and Paulios 2007).

Connecticut warblers inhabit poorly drained areas, including spruce-tamarack forests, wet second-growth forests, and grassy margins along spruce or deciduous forests. In Wisconsin, the Connecticut warbler uses jack pine forest and lowland conifers, especially black spruce and tamarack bogs with a good shrub layer. Forest structures selected for nesting are generally open canopies with a dense shrub and herb layer. Connecticut warblers nest on or near the ground, in the thick undergrowth of saplings, clumps of moss, and thickets.

LeConte's Sparrow

The LeConte's sparrow is a species of conservation concern in North Dakota and Wisconsin and is listed as a sensitive species on the LLR in Minnesota. Rangewide trends suggest stable populations, although trends in Minnesota and Wisconsin suggest nonsignificant declines (Sauer et al. 2007). Changes in land use have affected the extent and distribution of available grassland habitats used by this species. Haying may destroy nests and can be detrimental to breeding birds (Kreitinger and Paulios 2007). Populations nesting on grass-based agricultural fields in northern Wisconsin are probably declining with the declining availability of this habitat type (Kreitinger and Paulios 2007).

LeConte's sparrows prefer large, flat undisturbed, grass/sedge habitats with relatively tall, dense vegetation and abundant leaf litter. In Wisconsin, LeConte's sparrows use sedge meadows and bogs but are also found in fallow fields, grass-dominated hay fields, and pastures. LeConte's sparrows are intolerant of shrubs or woody vegetation in and around nesting sites; they nest from early May through August in grass clumps located just above the ground by using dead grasses and sedges with a grassy canopy (Kreitinger and Paulios 2007). LeConte's sparrows are a regular breeder in the northern third of Wisconsin and are locally found in large sedge meadows, hay fields, and pastures on the Superior Clay Plain in Douglas County, Wisconsin. During migration and during the winter, LeConte's sparrows are found in a variety of old fields, weedy areas, open grassy fields, and low-lying flat areas with overgrown vegetation (Kreitinger and Paulios 2007).

Nelson's Sharp-Tailed Sparrow

The Nelson's sharp-tailed sparrow is a species of conservation concern in North Dakota, Minnesota, and Wisconsin. The species is also listed as sensitive on the LLR in Minnesota. Nelson's sharp-tailed sparrows breed throughout northwestern Minnesota and in North Dakota where the population has remained stable (Sauer et al. 2007). This species has only recently been identified as a probable breeder in Wisconsin. Protection of large northern sedge meadow sites will continue to benefit this species and other sedge meadow specialists. Wisconsin's population may be heavily dependent on regional source populations from Minnesota and North Dakota.

The Nelson's sharp-tailed sparrow is found in large northern sedge meadows (over 100 acres) and sedge marshes in sites with an abundance of leaf litter. Nests are built on or just above the ground in grasses during late May through July. Nelson's sharp-tailed sparrows are promiscuous breeders with males forming loose colonies (Kreitinger and Paulios 2007). During migration, these birds are found in and around the edges of marshes and agricultural fields.

Upland Sandpiper

The upland sandpiper is a species of conservation concern in North Dakota and Wisconsin. The upland sandpiper breeds throughout the Alberta Clipper Project area in North Dakota, Minnesota, and Wisconsin. Rangewide trends for this species indicate that they are declining in abundance at a rate of about 1 percent per year (Sauer et al. 2007). Population declines in Wisconsin are some of the largest of any portion of this species' range (Kreitinger and Paulios 2007). This shorebird was once a common breeder in the continental United States. Market hunting, egg collecting, and its use as target practice in the 19th and early 20th century—coupled with the loss of suitable habitat—have resulted in significant declines of this bird outside of the Great Plains. Fragmentation of large blocks of grassland habitats and conversion of pastures and fallow fields to row crops have limited the available suitable habitat (Kreitinger and Paulios 2007).

Upland sandpipers nest on the ground during May to June in barrens, idle grasslands, old fields, fallow fields, and pastures. Upland sandpipers prefer dry grasslands with low to moderate forb cover, low woody cover, moderate amounts of residual vegetation and litter, and little bare ground. Commonly used habitats include lightly grazed pastures, old fields, idle grasslands, barrens, large dry forest clear-cuts, dry prairie, and hay fields. Loafing and brood-rearing habitats include heavily grazed pasture, hayfields, fallow fields, and row crops (Kreitinger and Paulios 2007).

Western Meadowlark

The western meadowlark is a species of conservation concern in Wisconsin. Western meadowlarks breed throughout North Dakota, Minnesota, and Wisconsin. This species has continued a slow decline throughout it range since 1966 (Sauer et al. 2007). Native grasslands used by this species have been almost completely lost since European settlement, and agricultural lands have undergone many changes since the late 1800s. The few remaining native grasslands are vulnerable to fragmentation, row crop conversion, urban development, and forest succession. Pastures, small grain fields, dry old fields, and hayfields also used by the western meadowlark are vulnerable to the same threats (Kreitinger and Paulios 2007).

Western meadowlarks are found in pastures and small grain fields. They also use short, open grasslands and agriculture fields including hayfields, short to medium height idle grasslands, dry old fields, dry-mesic prairies, and open barrens. Western meadowlarks are typically found in drier and more open areas than eastern meadowlarks, and western meadowlarks prefer habitats with less woody cover and shorter vegetation than eastern meadowlarks (Kreitinger and Paulios 2007). The western meadowlark remains widespread in southwestern Wisconsin, which contains relatively high acreages of prairie remnants, pastures, and CRP lands (Kreitinger and Paulios 2007).

Impact Assessment

Bald Eagle

Potential impacts to bald eagles include long-term loss or alteration of potential breeding, foraging, or winter habitats due to the removal of large trees and snags in the vicinity of large reservoirs, lakes, rivers,

and streams. Habitat fragmentation from right-of-way crossings through forested floodplains of large rivers and habitat degradation from invasion of noxious species are also potential impacts from construction. Direct mortality of adults and juveniles may occur due to collisions with construction vehicles, and mortality of eggs or young may occur due to nest disturbances.

Bald eagles are particularly sensitive to human disturbance at nests and communal roosts. Disturbances near an active nest or within line-of-sight of the nest could cause adult eagles to discontinue nest building or abandon eggs or juveniles. The Bald Eagle Management Guidelines and Conservation Measures (FWS 2006d) includes recommendations to minimize impacts to nests, including restricting activities within 660 feet of bald eagle nests in open country. In areas with forests or hills, where the line-of-sight distance from the nest is shorter, this protection distance can be reduced to 330 feet. Bald eagles are most sensitive to disturbance during the nesting season.

Connecticut Warbler

Confirmed breeding occurs in Douglas County, Wisconsin (Table 4.8.4-3); observed nesting sites in Wisconsin were south of the Alberta Clipper Project right-of-way (Kreitinger and Paulios 2007). If jack pine and black spruce/tamarack forest habitat occurring within the construction right-of-way was used by this species in Douglas County, Wisconsin, construction of the Alberta Clipper Project would exacerbate habitat fragmentation by widening the existing right-of-way from 125 to 200 feet. Nesting surveys specific for this species are planned across 5.9 miles of right-of-way likely to contain suitable habitat for the Connecticut warbler in Douglas County, Wisconsin between MP 1085 and MP 1097 (Enbridge, 2009b). Pipeline construction through this area is scheduled to occur between late-June and early September, which would potentially coincide with nesting for this species.

TABLE 4.8.4-3
Sensitive Bird Habitats Potentially Affected along the Alberta Clipper Project Route

Milepost	County	State	Habitat Description	Species Occurrence
1085 – 1089	Douglas	Wisconsin	Open forest with small wetlands throughout, stream crossings	Connecticut warbler, LeConte's sparrow, upland sandpiper – potential habitat.
1089 – 1090	Douglas	Wisconsin	Previously disturbed areas; open rural, road crossings, stream crossings	Connecticut warbler, Le Conte's sparrow, upland sandpiper, western meadowlark – potential habitat.

Sources: Enbridge 2008, 2009b.

LeConte's Sparrow

The LeConte's sparrow is likely to occur within the Alberta Clipper Project area in Douglas County, Wisconsin, and in the CNF in Cass County, Minnesota. Areas of sedge meadow, bog, and grass-dominated field and pasture habitat occurring in the construction right-of-way and used by this species in Douglas County, Wisconsin would be cleared during construction of the Alberta Clipper Project. However, herbaceous lands would recover relatively quickly (within 3 years), resulting in a temporary impact to the habitat and species. Nesting surveys specific for this species are planned across 5.9 miles of right-of-way likely to contain suitable habitat for the LeConte's sparrow in Douglas County, Wisconsin between MP 1085 and MP 1097 (Enbridge 2009b). Pipeline construction through this area is scheduled

to occur between late-June and early September, which would potentially coincide with nesting for this species.

Nelson's Sharp-Tailed Sparrow

Distribution maps indicate that this species does not occur in the Alberta Clipper Project area in Douglas County, Wisconsin (Kreitinger and Paulios 2007). The Nelson's sharp-tailed sparrow has been documented during the breeding season at a cattail marsh community crossed by the Alberta Clipper Project right-of-way in Pennington County, Minnesota (MDNR 2006). A downgradient pipeline crossover has been proposed for this location that would avoid impacts to the fen and would minimize impacts to the cattail marsh. A portion of the cattail marsh potentially used by this species would be cleared during construction of the proposed Project. Construction for this location is scheduled for after July 31, after most migratory birds have finished nesting (see the Migratory Bird Plan [Appendix V]).

Upland Sandpiper

Distribution maps indicate that this species is likely to be present in the Alberta Clipper Project area in Douglas County, Wisconsin (Table 4.8.4-3) (Kreitinger and Paulios 2007). Areas of grassland habitats, including old field, fallow field, and pasture habitat, occurring within the construction right-of-way and potentially used by this species for breeding in Douglas County, Wisconsin would be cleared during construction of the Alberta Clipper Project. However, impacts to the habitat and species would be short term as herbaceous lands would recover relatively quickly (within 3 years). Nesting surveys specific for this species are planned across 5.9 miles of right-of-way likely to contain suitable habitat for the Connecticut warbler in Douglas County, Wisconsin between MP 1085 and MP 1097 (Enbridge 2009b). Pipeline construction through this area is scheduled to occur between late-June and early September, which would potentially coincide with nesting for this species.

Western Meadowlark

Distribution maps indicate that this species is likely to be present in the Alberta Clipper Project area in Douglas County, Wisconsin (Kreitinger and Paulios 2007). Areas of grassland habitats, including old field, fallow field, and pasture habitat, occurring within the construction right-of-way and potentially used by this species for breeding in Douglas County, Wisconsin would be cleared during construction of the Alberta Clipper Project. However, impacts to the habitat and species would be short term as herbaceous lands would recover relatively quickly (within 3 years). Nesting surveys specific for this species are planned across 5.9 miles of right-of-way likely to contain suitable habitat for the Connecticut warbler in Douglas County, Wisconsin between MP 1085 and MP 1097 (Enbridge 2009b). Pipeline construction through this area is scheduled to occur between late-June and early September, which would potentially coincide with nesting for this species.

Mitigation and Monitoring

Mitigation of Project-related impacts on sensitive birds would be similar to measures described for other migratory birds in Section 4.6. To further protect nesting bald eagles, Enbridge also has committed to implement the following mitigation (NRG 2008a, 2008b):

- Contract a qualified biologist to conduct aerial surveys for nesting structures and document the location of any bald eagle nests within, or within 330 feet of, the construction right-of-way.

- Re-survey all documented bald eagle nests prior to clearing activities to determine whether the nest was still active. Enbridge would continue to consult with FWS on the current locations of active nests.
- Construction activities would be suspended:
  - In North Dakota – during December through August within 660 feet of any active bald eagle nest;
  - In Minnesota – during February 15 through August 15 within 2,640 feet (0.5 mile) of any active bald eagle nest;
  - In CNF – within 330 feet, and limited activity within 330 to 660 feet of any active bald eagle nest; and
  - In Wisconsin – during February 15 through August 15 within 1,320 feet (0.25 mile) of any active bald eagle nest.

To protect other sensitive birds, Enbridge also has committed to implement the following mitigation in its Migratory Bird Plan (Appendix V) (NRG 2008a, 2008b):

- Minimize loss to migratory bird nests by obtaining approval for clearing activities in migratory bird areas of concern beginning in March, prior to the primary nesting periods for a majority of these species;
- Conduct ground surveys focused on birds of conservation concern within areas to be cleared of vegetation during the nesting season from May 1 to July 31 and provide appropriate protections to all active migratory bird nests identified during the survey in compliance with the MBTA;
- No vegetation clearing within the CNF during the migratory bird nesting season May 1 through July 31; and
- Although construction of new overhead power lines are not anticipated, if new or updated overhead power lines are constructed, they would be in accordance with FWS current guidelines for preventing raptor electrocutions (FWS 2006a,).

To further minimize impacts to potential habitat for the Nelson's sharp-tailed sparrow, we recommended in Section 4.5.6.2 that a CMP be developed and provided to the COE prior to construction through the cattail marsh in Pennington County, Minnesota near MP 853 to MP 854, and that proposed site plans be provided to MDNR and MPUC prior to construction through the area. These measures would ensure that the site is protected by site-specific mitigation measures approved by the applicable agencies.

Conclusion

Based on an evaluation of the occurrence of sensitive birds and protective measures proposed by the Applicant, construction of the Alberta Clipper Project would result in a small reduction in available habitats for sensitive bird species and may result in the disturbance of a few nests of sensitive bird species. Impacts to sensitive birds would be minimized by the recommended clearing of vegetation during non-nesting periods, as discussed for other migratory birds in Section 4.6.

4.8.4.2 Sensitive Mammals

Background

Mountain Lion/Cougar

The mountain lion is a species of conservation concern in Minnesota and is listed as endangered on the LLR. This species was probably never common in eastern North Dakota, Minnesota, or Wisconsin. The last mountain lion taken in Minnesota was killed in Becker County, in 1897. In recent years, there have been several reports of mountain lion sightings and tracks north of Duluth, Minnesota. Mountain lions probably disappeared from Wisconsin by about 1910 but have been sporadically sighted in Wisconsin since 1991. Starting in about 1990, mountain lion sightings began increasing in North Dakota—mainly in the southwestern corner of the state near the rugged terrain of the badlands and Turtle Mountain (Wilson 2005; NDGFD 2006b, 2007). Their range has expanded throughout the state, with the confirmed sighting nearest to the Project area occurring in Grand Forks County, North Dakota, approximately 30 miles southwest of the closest point of the proposed Project. Collared animals have been confirmed as far east as northwest Minnesota (Wilson 2005). In 2005, NDGFD began limited experimental hunting seasons to manage population levels (NDGFD 2007). Today, a quota of five animals is enforced throughout the mountain lion's primary range in the southwest corner of the state and they are rare in the rest of the state (Wilson 2008).

Mountain lions usually prey on deer, but will also eat small rodents and rabbits. They use a variety of habitats and range widely in search of prey. In general, mountain lions are not likely to occur in the Alberta Clipper Project area; however, mountain lions have been sighted on and near the FDL Reservation in St. Louis and Carlton Counties in Minnesota, and in Douglas County, Wisconsin (Wiedenhoeft and Wydeven 2006, FDL 2009).

Franklin's Ground Squirrel

The Franklin's ground squirrel is a species of conservation concern in Wisconsin and is considered a sensitive species on the LLR, although it is not otherwise listed in Minnesota. The Franklin's ground squirrel has been reduced in abundance and distribution, presumably by modern agricultural techniques. They are semi-colonial and territorial, typically occurring along fencelines, railroad rights-of-way, and open woodlands in the prairie regions of Wisconsin. Optimal habitat appears to include tall and short grasses near a forest edge, with a wetland, riverbank, or ditch nearby. Dikes and old railroad grades act as dispersal corridors. Burrows are inconspicuous, with openings from 2 to 3 inches, usually near the base of low-growing shrubs. These squirrels feed on green plants, seeds, insects, bird eggs, and nestlings. The occurrence of this species within the Alberta Clipper Project area is unknown.

Impact Assessment

Mountain Lion

These secretive cats would be most likely to occur in forested portions of the Alberta Clipper Project area in Minnesota. Forested habitats potentially used by this species within the construction right-of-way in Minnesota would be lost during construction. However, as mountain lion are not expected to occur often in the Project area, and they would likely avoid areas of active construction, they are not likely to be adversely affected by construction or operation of the proposed Project.

Franklin's Ground Squirrel

The Franklin's ground squirrel could occur within the Alberta Clipper Project area, including the LLR and in Douglas County, Wisconsin. If it did occur, this colonial burrowing animal would be likely to occur in edge habitats crossed by the Project, including fencelines, railroad rights-of-way, and open woodlands. If edge habitats within the construction right-of-way in Beltrami, Cass, or Itasca Counties, Minnesota or in Douglas County, Wisconsin are occupied by the Franklin's ground squirrel, burrows and potentially individuals would be lost during construction. If construction occurred during winter, hibernating squirrels would potentially be lost. Squirrels may or may not leave their burrows if construction occurs during their active period (from April to September). Destruction of burrows of this species would cause, at a minimum, displacement; and, if no suitable habitat is available nearby for construction of new burrows, squirrels would likely experience poor survival. Compaction of soils from construction equipment could leave habitats within the temporary right-of-way unsuitable for burrowing.

Mitigation and Monitoring

Mitigation of Project-related impacts on sensitive mammals would be similar to measures described for game mammals in Section 4.6.

Conclusion

Based on an evaluation of the occurrence of sensitive mammals and protective measures proposed by the Applicant, construction of the Alberta Clipper pipeline could result in a small reduction in available habitats and displacement from the Project area of a few individuals. Impacts to sensitive mammals would be minimized by implementation of the Enbridge's state-specific EMPs (Appendix C), as discussed for other mammals in Section 4.6.

4.8.4.3 Sensitive Aquatic Animals

Background

Forcipate Emerald Dragonfly

The forcipate emerald dragonfly is a state-listed species of concern in Wisconsin. This dragonfly is generally considered imperiled throughout most of its range in the United States, where it has been evaluated. The species is known to occur in Minnesota and Wisconsin. The forcipate emerald is currently known to occur in northeastern Minnesota but may be found throughout the northern third of Minnesota.

The forcipate emerald is considered a river-breeding dragonfly; in Minnesota, this species occurs in small boggy streams. Little has been reported on its ecology and life history. Several of the species of *Somatochlora* found in Minnesota appear to use slow-water boggy streams in the northern half of the state (Haarstad 1997). Within the Alberta Clipper Project area, the forcipate emerald dragonfly has been reported in St. Louis County, Minnesota and in Douglas County, Wisconsin.

American Eel

The American eel is state-listed as a species of conservation concern in Minnesota and Wisconsin. The American eel does not occur in North Dakota. This species occurs in drainages crossed by the Alberta Clipper Project right-of-way in Minnesota and Wisconsin. Although the status of the species is poorly understood, populations of the American eel appear to have decreased, possibly due to barriers to

migration, habitat loss and alteration, hydroturbine mortality, oceanic conditions, overfishing, predation, parasitism, and pollution. Construction of canals in the Great Lakes region has influenced the distribution of the American eel. In addition, American eels have been introduced (stocked, released, and escaped) in several inland areas, including the Great Lakes region. The Welland Canal provided eels with access to the upper Great Lakes. American eels are uncommon in Minnesota and Wisconsin.

Some larval eels travel upstream from marine and estuarine habitats and spend the majority of their life growing in rivers, streams, ponds, and the shallow, more productive areas of lakes before they migrate to the ocean as adults to spawn. Soft, undisturbed bottom sediments may be important to migrating larval eels. Postlarval eels tend to be bottom dwellers and hide in burrows, tubes, snags, plant masses, other types of shelter, or in the substrate. In the north, they are inactive in bottom mud during winter. In freshwater, eels feed on insects (especially mayflies, stoneflies, and caddisflies), worms, crayfish and other crustaceans, and small frogs and fishes; the diet varies geographically, seasonally, and among size classes. Eels may remain in freshwaters for 2 to 19 years.

Lake Sturgeon

The lake sturgeon is state-listed as a species of conservation concern in Minnesota and Wisconsin, and is considered extirpated, or locally extinct, in North Dakota. The species occurs in drainages crossed by the Alberta Clipper Project right-of-way and is generally a bottom-dweller in large rivers and shallow areas of large lakes. Over-fishing, habitat alteration, and pollution have turned this species from one of the most abundant large fishes into one of the rarest. Poor water quality and migration barriers (locks and dams) continue to prevent its recovery in the lower Mississippi River.

The habitats most commonly associated with lake sturgeon are silt-free, deep-run and pool habitats of rivers—generally lacking aquatic vegetation. The spawning season for lake sturgeon spans the months of April, May, and sometimes June. Males do not reach sexual maturity until they are 20 years old, and females are usually 25 years old before they spawn for the first time. Females spawn only every 4 to 6 years, while the males usually spawn every other year. Lake sturgeon generally migrate long distances to reach suitable spawning habitat. Dams and other navigation devices can interfere with this migration and force sturgeon to spawn in unsuitable areas. Spawning occurs in gravelly tributary streams of rivers and lakes; although rocky, wave-swept areas near islands can serve as alternative locations.

Black Sandshell Mussel

The black sandshell mussel is considered a sensitive species on the LLR as well as a species of conservation concern in North Dakota and Minnesota. In North Dakota, the species does not occur in drainages crossed by the Alberta Clipper Project right-of-way. In Minnesota, the black sandshell is distributed statewide. Degradation of lakes and rivers from runoff of silt and chemicals—as well as hydrologic changes from damming, channelization, and dredging—have reduced populations of native mussels in North America. The invasive zebra mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena bugensis*) competitively exclude and smother native mussels. The black sandshell is found in medium to large rivers with strong current and coarse sand and gravel with cobble substrates. Larvae of this mussel are parasitic on fish.

Creek Heelsplitter Mussel

The creek heelsplitter mussel is considered a sensitive species on the LLR, as well as a species of conservation concern in North Dakota and Minnesota. In North Dakota, the species does not occur in drainages crossed by the Alberta Clipper Project right-of-way. This wide-ranging species is stable in most areas except at the edges of its range. In Minnesota, the creek heelsplitter is distributed statewide.

Degradation of lakes and rivers from runoff of silt and chemicals, in addition to hydrologic changes from damming, channelization, and dredging, has reduced populations of native mussels in North America. The invasive zebra mussel and quagga mussel competitively exclude and smother native mussels. Creek heelsplitters are found in variable sizes of rivers and streams with gravel, sand, or mud substrates. They are rarely found in lakes. Larvae of this mussel are thought to be parasitic on fish.

Fluted Shell Mussel

The fluted shell mussel is considered a species of conservation concern by Minnesota. This mussel is found throughout most of the Mississippi River system, in some of the southern and western tributaries of the Great Lakes, and in some tributaries of Hudson Bay. The fluted shell is considered stable throughout most of its range except in the western plains states. The zebra mussel has been sited as a threat for the fluted shell. In Minnesota, this species occurs in the Red River of the North, the St. Croix River, the Mississippi River drainages, and in the Lake of the Woods. The fluted shell is found in canals, rivers, and lakes with gravel, sand, or mud bottoms. Larvae are parasitic on fish.

Impact Assessment

Forcipate Emerald Dragonfly

Suitable habitat for the forcipate emerald dragonfly that could potentially be affected by construction of the Alberta Clipper Project is listed in Table 4.8.4-4. Threats to forcipate emerald habitat include riparian habitat degradation, alteration of water quality or quantity, pesticide use, and invasion by non-native species. Construction of the Alberta Clipper Project could degrade riparian habitats. A site-specific Pokegama CRM Plan has been developed for the Pokegama Carnegie Wetlands SNA/ASNRI that would minimize construction-related wetland impacts for this area, which coincides with the occurrence of the forcipate emerald dragonfly (Appendix T).

TABLE 4.8.4-4
Forcipate Emerald Habitats Potentially Affected along the Alberta Clipper Project Route

Milepost	State	County	Habitat Quality	Summary
1087	Wisconsin	Douglas	Unknown	Documented occurrence – Pokegama River
1094	Wisconsin	Douglas	Unknown	Documented occurrence – Pokegama River

Source: WDNR 2007.

Fish and Mollusks

Declines in big river fishes such as the lake sturgeon and migratory fish such as the American eel have been caused primarily by habitat alteration for navigation, channelization, and bank stabilization and by hydropower generation projects that have caused loss of the dynamic habitats once common throughout the Great Lakes states and in the upper Mississippi River drainage. Dams have blocked spawning migrations, isolated populations, destroyed rearing and spawning habitats, and altered food supply; in addition, dams have altered flow, turbidity, and temperature regimes.

The Alberta Clipper Project could adversely affect sensitive fish and mollusks by:

- Physical disturbance at the waterbody crossing;
- Sedimentation due to trenching, backfilling, and streambank erosion;
- Loss of bank cover and habitats;
- Entrainment of small fish and forage species, altered water temperatures and water quality, and increased erosion and scour from withdrawal or discharge of water for hydrostatic testing; and
- Cross-drainage introductions of invasive aquatic species.

American Eel and Lake Sturgeon. River habitats potentially used by the American eel and lake sturgeon could be adversely affected by waterbody crossings for the Alberta Clipper Project. Enbridge plans to use HDD crossings at some major river crossings where these fish may occur (Section 4.7). If waters containing American eel or lake sturgeon were crossed by open-cut, dam-and-pump, or flume methods, stream bottom and riparian habitats would be disturbed and increased sedimentation is likely to occur. Loss of riparian vegetation could increase erosion, and reduced over-water cover could result in increased water temperatures. Crossings using HDD would eliminate stream bottom impacts from crossing and would minimize some riparian impacts. HDD does carry a risk of the escape of drilling fluids into rivers at the crossings, which could result in short-term sediment transport and water quality impacts that could adversely affect aquatic species. The use of significant amounts of surface waters for hydrostatic testing of the pipeline could adversely affect the American eel and lake sturgeon through reduced streamflow and entrainment of eggs and larvae. In addition, water withdrawal for hydrostatic testing could entrain juvenile eels or larval fish and uptake eggs of the lake sturgeon.

Black Sandshell, Creek Heelsplitter, and Fluted Shell Mussels. Declines in native mussels throughout the Midwest are primarily caused by habitat loss and degradation. These losses have been documented since the mid-19th century; causes include impoundment, channelization, chemical contamination, dredging, and sedimentation. Mussel habitat loss and degradation occur from gravel dredging, stream channelization, destabilization of stream substrates, and altered water flows. Most of the remaining populations of native mussels are small and isolated, making them more susceptible to extirpation from a catastrophic event. Isolated populations also decrease the gene flow through each species, leading to inbreeding depression within populations. Spread of the exotic zebra mussel is a threat to native freshwater mussels. Zebra mussels attach themselves to native mussels and restrict feeding and reproductive activities of the native mussels. They quickly out-compete native species, sometimes leading to their suffocation.

These medium to small river mussels (black sandshell, creek heelsplitter, and fluted shell mussels) occur along the Alberta Clipper Project at the crossing locations listed in Table 4.8.4-5.

Mitigation and Monitoring

Construction of the Alberta Clipper pipeline across the Red Lake River and the Prairie River would use the HDD method; therefore, benthic habitats for these mussels would not be affected by pipeline construction at this location. Hydrostatic test waters would be returned to the same location from which they were withdrawn. All equipment used to pump water would be thoroughly cleaned between locations where water would be withdrawn for HDD and hydrostatic testing to prevent any movements of zebra mussels. Mussels at the other river or stream crossings would be affected by open trench crossing of these habitats.

TABLE 4.8.4-5 Waterbody Crossings Containing Sensitive Mollusks along the Alberta Clipper Project Route					
Approx. Milepost	**County**	**State**	**Waterbody (Type)[a]**	**Proposed Crossing Method[b]**	**Species, Habitat – Occurrence Survey Results**
864.3	Pennington	Minnesota	Red Lake River, P	HDD	Creek heelsplitter, black sandshell, fluted shell mussels – Survey found live specimens of all three mussels plus six other species. Good habitat.
885.8	Red Lake	Minnesota	Lost River, I	DC	Creek heelsplitter mussel – Survey found live mussels plus five other species. Suitable habitat. Mussels at this crossing were relocated for construction of the LSr Project pipeline through the right-of-way.
922.3	Beltrami	Minnesota	Clearwater River, P	DC	Surveyed for potential habitat. No sensitive mussels – Survey found dead shell of one species; no live mussels were found. Poor habitat, cold water.
1010.0	Itasca	Minnesota	Prairie River, P	HDD	Black sandshell mussel – Survey found dead shells of black sandshell and one other species; two other live species were found. Poor habitat.
1024.2	Itasca	Minnesota	Swan River, I	DC	Creek heelsplitter – Survey found creek heelsplitter plus two other species. Poor habitat.

[a] Waterbody types: P = Perennial stream, I = Intermittent stream.

[b] Crossing methods: HDD = Horizontal directional drilling; DC = Dry crossing (dam-and-pump or flume).

Source: ESI 2008.

Additional mitigation of Project-related impacts on sensitive aquatic animals would be similar to measures described for fish in Section 4.7. Enbridge has proposed specific mitigation to protect sensitive aquatic animals as requested by FWS, NDGFD, MDNR, and WDNR, and identified below.

To avoid and mitigate potential impacts on the forcipate emerald dragonfly, Enbridge would:

- Construct the pipeline through the Pokegama Carnegie Wetlands SNA/ASNRI during late summer when the wetlands are typically dry and
- Implement post-construction restoration of the Pokegama Carnegie Wetlands SNA/ASNRI, likely to include options such as:
    - Fine grading to recreate micro-topographic depressions;
    - Reconnecting drainageways and swales; and
    - Encouraging the establishment of rare wetland plants.

To avoid impacts on lake sturgeon, Enbridge would:

- Acquire all necessary permits needed for water withdrawal.
- Periodically check screened intake ends of water pumps for entrainment of fish. Withdrawal rates would be low, with velocities at the intake of less than 15 centimeters per second, which would further reduce the potential for entrainment or entrapment.

In addition, to further minimize impacts to the creek heelsplitter, and in accordance with expected COE permitting requirements, **we recommend that**:

- **Enbridge relocate the creek heelsplitter mussels encountered in the Swan River (MP 1024.2) prior to instream construction and/or in accordance with COE requirements associated with these waterbody crossings.**

Conclusion

Based on an evaluation of the occurrence of sensitive fish species and protective measures proposed by the Applicant, construction of the Alberta Clipper Project is not likely to affect the lake sturgeon population. Small amounts of aquatic habitats used by sensitive aquatic animals would be altered and restored during construction of the Alberta Clipper Project, and a few individuals may be lost due to construction of the Project.

4.8.4.4 Sensitive Plants

Background

Eighteen special concern plants have been identified as potentially occurring within the Alberta Clipper Project area (see Tables 4.8.4-1 and 4.8.2-3). These plants are associated with native prairie, calcareous fen, emergent and riparian wetland, and forested habitats—as described in Sections 4.4 and 4.5 (wetlands and vegetation) and in Section 4.8.2 (under state-listed plants). These habitats have been extensively altered across much of the Project area, primarily by conversion and drainage of land for agricultural production.

Native Prairies

Fragments of native prairie habitats remain in some locations throughout the Alberta Clipper Project area. Most native prairie habitats in North Dakota, Minnesota, and Wisconsin have been lost because of conversion of land to agricultural or urban uses. Sensitive plants associated with wet and mesic prairie remnants within the Alberta Clipper Project right-of-way include the small white lady's slipper (species of concern in Minnesota), as well as the flat-stemmed spike-rush and northern yellow lady's slipper (both species of concern in Wisconsin).

Grape Ferns & Moonworts (*Botrychium*)

Two species, Mingan moonwort and least moonwort, that are listed as species of conservation concern in Minnesota, occur within the Alberta Clipper Project right-of-way in Cass County, Minnesota; two other moonwort species also have been documented within the Alberta Clipper Project right-of-way. Identification of sensitive and state-listed moonworts within the right-of-way during construction of a collocated pipeline led to development of a post-construction monitoring plan, including experimental treatments, transplantation and soil segregation, and annual monitoring. A discussion of other *Botrychium* species that are state-listed as threatened or endangered is provided in Section 4.8.2.4.

Calcareous Fens

Calcareous fen wetlands are designated as Outstanding Resource Value Waters by MDNR and are given special protection through Minnesota Rules and statutes. Calcareous fens result from the upwelling of groundwater through calcareous substrates such as limestone or dolomite. Impacts to groundwater hydrology in the vicinity of the fen have the potential to degrade these habitats. Sensitive plants associated with calcareous fen wetlands within the Alberta Clipper Project right-of-way include singlespike sedge (species of concern in Minnesota), as well as common bog arrow-grass, Crawe sedge, and slim-stem small reedgrass (each species of concern in Wisconsin). Neither the two calcareous fens nor the fen-like area located near the proposed Project would be crossed by the pipeline; therefore, sensitive plants in these habitats would not be directly impacted by construction or operation of the proposed Project. A discussion of state-listed threatened and endangered species associated with calcareous fens is provided in Section 4.8.2.6.

Emergent and Riparian Wetlands

Emergent and riparian wetlands occur in depressions, marshes, and lake edges; along river and stream edges; and within the channels of small, slow-flowing streams. Emergent communities are sustained by permanent standing water and are generally dominated by robust emergent macrophytes. These habitats support rare wetland-associated plants that occur within the Alberta Clipper Project area, including the smooth black sedge, marsh horsetail, variegated horsetail, Vasey's rush (each of which are species of concern in Wisconsin), club-spur orchid, Lapland buttercup (each species of concern in Minnesota and threatened on the LLR), and the clustered burr-reed (a species of concern in Minnesota and considered threatened by the State of Wisconsin and the LLR). A discussion of state-listed threatened and endangered species associated with these wetland habitats is provided in Section 4.8.2.6.

Forests

Three species of Wisconsin-designated plants of conservation concern occurring in the Alberta Clipper Project area are associated to some degree with forests or forested wetland habitats. The showy lady's slipper is a perennial orchid 16 to 40 inches tall with pouched white and pink flowers. This plant is associated with northern lowland forest communities. The large-flowered ground cherry is found primarily in disturbed habitats such as recently burned forests and on gravel river bars. This plant is a perennial nightshade, 1 to 3 feet tall, with a cream to white flower with a yellow center. The large roundleaf orchid is found in woods and forests with rich soil and is associated with boreal forest, northern lowland forest, and northern upland forest vegetation communities. This orchid is a perennial forb with round basal leaves that lie flat on the ground and a flower stalk 8 to 16 inches tall with whitish to greenish flowers.

Impact Assessment

Surveys for wetland-dependent rare plants have been completed for portions of the proposed route north of Clearbrook, Minnesota and for the entire 13 miles of right-of-way in Douglas County, Wisconsin. The results of these surveys are provided in Table 4.8.2-3. The Alberta Clipper Project could adversely affect sensitive plants by:

- Temporary and permanent modification of vegetation community composition and structure from clearing and operational maintenance;
- Increased risk of soil erosion from lack of vegetative cover;

- Expansion of invasive and noxious weed populations along the pipeline right-of-way as a result of construction and operational vegetation maintenance;
- Loss of plant species and habitats as a result of construction clearing and grading;
- Soil and sod disturbance (mixing of topsoil with subsoil with altered biological activities and chemical conditions that could affect reestablishment and natural recruitment of listed plant species after restoration);
- Compaction and rutting of soils from movement of heavy machinery and transport of pipe sections, altering natural hydrologic patterns, inhibiting seed germination, or increasing siltation; and
- Alteration in vegetation productivity and phenology because of increased subsurface soil temperatures associated with heat loss from the pipeline.

Mitigation and Monitoring

Measures to reduce impacts to vegetation described in Enbridge's state-specific EMPs (Appendix C) and Revegetation and Restoration Monitoring Plans (Appendix K) are described in Sections 4.5.6.1 and 4.5.6.2. Enbridge has developed site specific avoidance measures, as described in Table 4.8.2-3, to protect sensitive vegetation communities including:

- Directional bore for pipeline installation beneath mesic prairie remnants;
- Route modifications, pipeline crossovers, and narrowing of the construction right-of-way to avoid rare plants;
- Fencing off rare plants to avoid accidental construction impacts;
- Development of a rare plant mitigation plan for the CNF that would minimize or mitigation impacts to rare plants within the boundaries of the CNF;
- Temporary removal of rare sedges in blocks of sod, holding and subsequent replanting; and
- Post-construction restoration of rare wetland plants in the Pokegama Carnegie Wetlands, likely to include options such as:
    - Fine grading to recreate micro-topographic depressions;
    - Reconnecting drainageways and swales;
    - Limiting seeding to an annual cover crop that would not compete with re-establishment of rare plants;
    - Conducting onsite seed collection for reseeding after completion of fine grading activities; and
    - Identifying potential special seed mixes.

Sensitive plant communities and species located in the construction right-of-way generally would be avoided by horizontal bore (native prairies) or route adjustments (calcareous fens). In addition, impacts would be minimized through implementation of the mitigation measures listed in its state-specific EMPs (Appendix C), Noxious Weed Plans (Appendix H), and Revegetation and Restoration Monitoring Plans (Appendix K). A potential calcareous fen has been identified in Polk County, Minnesota, near MP 893. To avoid impacting the fen and any protected plant species located within the fen, Enbridge would route around the feature and continue to work with MDNR to minimize impacts to protected resources in the area. To further minimize impacts to the calcareous fen/cattail marsh wetland complex that occurs at MP 853 to MP 854, we have recommended that a CMP and site plans be submitted to the applicable agencies—in accordance with expected COE, MDNR, and MPUC permitting requirements that would

provide site-specific mitigation measures for the habitat and the sensitive plant species that occur there (see Section 4.5.6.2).

Conclusion

Based on an evaluation of the occurrence of sensitive plant communities and species and protective measures proposed by the Applicant, construction of the Alberta Clipper Project would result in temporary impacts to wetland habitat known to contain sensitive plants and may result in the loss of one instance of clustered burr-reed and four instances of Vasey's rush for which mitigation has not been proposed (Table 4.8.2-3). Due to the implementation of Enbridge's protection measures and measures recommended by state resource agencies and the COE, no population level impacts would be expected for any sensitive plant species.

4.8.5 Connected Actions

The Superior Terminal Expansion Project, considered a connected action to the proposed Project, includes construction of five new storage tanks and a 4,600-foot facility line in Superior, Wisconsin. No federally protected threatened or endangered species are known to occur in or near the existing terminal, and no additional habitat or disturbance-related impacts are expected from construction of the new storage tanks or facility line that could affect federally protected threatened or endangered species.

Three state-listed threatened or endangered plants, seaside crowsfoot, arrowleaf sweet coltsfoot, and slender spike rush, occur in wetland habitats near the existing Superior Terminal (MNR 2008b); however, only the threatened arrowleaf sweet coltsfoot was encountered during surveys within the area of the proposed expansion. Habitat for the arrowleaf sweet coltsfoot would be further reduced or altered by construction of the five new storage tanks.

Vasey's rush is a Wisconsin species of concern that occurs within the Superior Terminal expansion area. Habitat for the Vasey's rush would be reduced or altered by construction of the new storage tanks. Expansion of the Superior Terminal may affect, but is not likely to adversely affect the continued existence of this species. No other threatened, endangered, or sensitive animals or plants are known to occur in or near the expansion area.

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4.9 LAND USE, RECREATION AND SPECIAL INTEREST AREAS, AND VISUAL RESOURCES

The Alberta Clipper Project would primarily consist of a new 326.9-mile pipeline to transport heavy crude oil. The pipeline would cross the states of North Dakota, Minnesota, and Wisconsin. Aboveground facilities would include new pumps and new piping at existing stations, 32 new mainline valves, one launcher, two receivers, booster pumps, storage tanks, and 54.5 miles of access roads. As discussed in Section 1.7.1.1, the Diluent Project would also be co-constructed with the Alberta Clipper Project.

Construction, operation, and maintenance of the pipeline facilities and access routes for the Alberta Clipper Project would cause temporary and permanent impacts to various types of land uses, such as agriculture, open land, wetlands, waterbodies, residential land, and recreational and other special interest areas (e.g., public lands). In general, lands required for construction would be temporarily impacted, while lands required for operation of the Project would be permanently impacted. The potential impacts and mitigation measures identified in the following sections apply to the entire footprint of the Alberta Clipper Project.

4.9.1 Existing Conditions

4.9.1.1 Land Use

Within North Dakota, the primary land use type is agricultural (62.7 percent) followed by grassland pasture (26.1 percent) (USDA Economic Research Service 2002).

According to the USDA Economic Research Service (2002), the major land use types in Minnesota are agricultural land (45.7 percent) followed by forested land (32.7 percent). Many of the counties along the western border of the state and the southern part of the state are dominated by agricultural land. The counties within the northern and northeastern part of the state are composed of mainly forested lands and wetlands.

Within Wisconsin, the largest land use type is forestland (45.2 percent) followed by agricultural land (31.0 percent) (USDA Economic Research Service 2002).

Agricultural

There is an estimated 27.7 million acres of agricultural land in North Dakota, 23.3 million acres within Minnesota, and 10.8 million acres in Wisconsin (USDA Economic Research Service 2002). Agricultural land is the dominant land use type in North Dakota and Minnesota.

Numerous tracts of land are enrolled in USDA programs managed through NRCS and FSA. The goals of these programs are to reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters (NRCS 2008). Examples of NRCS programs are the WRP, EWP Program, the Farm and Ranchland Protection Program, and the Wildlife Habitat Incentives Program. FSA programs include the CRP, the Conservation Reserve Enhancement Program, the Farmable Wetlands Program, and the Emergency Conservation Program.

The CRP is the largest of these programs. Landowners who participate in this program can receive annual rental payments to establish long-term vegetation on eligible lands that are prone to erosion. CRP protects million of acres of topsoil from erosion and is designed to safeguard natural resources. The program encourages farmers to convert highly erodible cropland or other environmentally sensitive

acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter strips, or riparian buffers. Participants enroll in CRP contracts for 10 to 15 years.

In 2007, a total of 3.0 million acres of land were enrolled in the CRP program in North Dakota; in Minnesota, 1.8 million acres were enrolled; and in Wisconsin, 0.5 million acres were enrolled in the program (USDA 2007).

Forested

North Dakota has 0.7 million acres and Minnesota has 16.7 million acres of forested land. Forested land is the dominant land use type in Wisconsin, with approximately 16.0 million acres of land. These lands include forested land in state forests and parkland (USDA Economic Research Service 2002).

Developed

North Dakota has 94,000 acres of urban land, Minnesota has 966,000 acres, and Wisconsin has 1.1 million acres of urban land. It is also estimated that North Dakota has 869,000 acres of transportation area including highways and roads, railroads, and airports. Minnesota has 1.2 million acres of transportation area and Wisconsin has 954,000 acres (USDA Economic Research Service 2002)

Wetlands

North Dakota has approximately 4.0 million acres of wetlands (MDNR 2008a) throughout the state. Within Minnesota, it is estimated that there are approximately 9.3 million acres of wetlands (WDNR 2008); while in Wisconsin, USGS estimates that there are about 5.3 millions acres of wetlands (ND Parks and Recreation 2007). Each state currently conducts wetland management and restoration projects.

4.9.1.2 Recreation and Special Interest Areas

There are numerous recreation and special interest areas throughout the states of North Dakota, Minnesota, and Wisconsin. Table 4.9.1-1 details the recreation and special interests lands that would be intersected by the Project. As indicated in Table 4.9.1-1, no recreation or special interest lands would be crossed in North Dakota, except the Pembina River. Minnesota has numerous recreation and special interest areas that would be crossed. There are four special interest areas in Wisconsin. Several of the areas listed in the table are discussed in detail below.

Leech Lake Reservation and Chippewa National Forest

The LLR is located in Cass, Itasca, Beltrami, and Hubbard Counties, Minnesota, with an area of over 670,000 acres. Approximately 212,000 acres are the surface areas of three relatively large lakes. The LLR and CNF overlap, and approximately 75 percent of the CNF is within the boundaries of the reservation (EPA 2008).

The CNF has over 666,000 acres of total managed forestland. Numerous recreational activities occur within the National Forest, including camping, hiking, use of snowmobile trails, hunting, fishing, and bird watching (Forest Service 2008). The proposed pipeline would cross about 34.1 miles of the CNF. For a more detailed discussion of the resources potentially impacted by the proposed Project on the CNF and LLR, see Appendix U.

TABLE 4.9.1-1
Special Interest Areas Crossed by the Alberta Clipper Project

Site Name	Milepost	Miles Crossed	Ownership
Minnesota			
Mississippi Headwaters State Forest	924.7 to 925.2	0.5	Minnesota Department of Natural Resources (MDNR)
Mississippi Headwaters State Forest	928.7 to 933.5	4.8	MDNR
Great River Road Scenic Highway	937.6	N/A	U.S. Department of Transportation (DOT)
U.S. Highway 2	932.5 to 1044.1	N/A	DOT
Leech Lake Reservation	950.8 to 993.9	42.7	Indian Reservations Bureau of Indian Affairs
Bowstring State Forest	958.0 to 986.0	28.0	MDNR
Soo Line North All-Terrain Vehicle (ATV) Trail	958.3	N/A	
Soo Line North ATV Trail	964.9	N/A	MDNR
Bowstring State Forest	988.7 to 988.8	0.1	MDNR
Chippewa National Forest	955.7 to 988.8	33.1[a]	U.S. Forest Service
Chippewa National Forest	994.2 to 995.3	1.1	U.S. Forest Service
Great River Road Scenic Highway	988.9	N/A	Itasca County
Edge of the Wilderness Scenic Byway	1007.8	N/A	Minnesota Department of Transportation (DOT)
Fond du Lac Reservation	1058.6 to 1071.6	12.9	Indian Reservations Bureau of Indian Affairs
Fond du Lac State Forest[b]	1059.8 to 1062.2	2.5	MDNR
Veterans Evergreen Memorial Scenic Byway	1082.8	N/A	Minnesota DOT
Douglas County Forest	1090.6 to 1093.8	2.5	Douglas County
Superior Airport/Hill Avenue/South Superior Triangle Area of Special Natural Resource Interest	1096.0 to 1097.6	1.6	Douglas County
Pokegama Carnegie Wetlands[c]	1090.8 to 1094.0	3.2	WDNR
Nemadji Golf Course	1096.3 to 1096.9	0.6	Private land
58 snowmobile trail crossings	817.0 to 1073.9	N/A	Private and public land

Notes: N/A = Not applicable.

No special interest areas in North Dakota would be crossed by the proposed Project.

[a] The area of the Chippewa National Forest crossed by the proposed pipeline is completely within the Leech Lake Reservation.

[b] The Fond du Lac State Forest crossed by the proposed pipeline is completely within the Fond du Lac Indian Reservation.

[c] The state natural area portion of the Pokegama Carnegie Wetlands crossed by the proposed pipeline is completely within Douglas County Forest.

Source: Enbridge 2009.

Fond du Lac Reservation

The FDL Reservation is located within St. Louis and Carlton Counties in Minnesota. The reservation has an area of approximately 100,000 acres (FDL 2009). The proposed pipeline route would cross the FDL Reservation from MP 1058.6 to MP 1071.6.

State Forests

The proposed pipeline route would cross three state forests in Minnesota: Bowstring, Fond du Lac, and Mississippi Headwaters. Bowstring State Forest is located in Cass and Itasca Counties. The forest contains hiking trails and camp sites, and provides fishing and swimming areas for public use (MDNR 2008b). The pipeline would cross Bowstring State Forest from MP 958 to MP 988.8, traversing approximately 28 miles of forested land.

Fond du Lac State Forest is located in St. Louis and Carlton Counties, Minnesota. Skiing, hunting, snowmobiling, and all-terrain vehicle use all occur within the state forest at some point during the year (MDNR 2008b). The pipeline would cross the Fond du Lac State Forest from MP 1059.8 to MP 1062.2, traversing approximately 2.5 miles of forested land.

The Mississippi Headwaters State Forest is a Laurentian mixed forest located in Beltrami County, Minnesota. Recreational activities that occur within the forest boundaries include picnicking, fishing, and swimming (MDNR 2008b). The pipeline would cross Mississippi Headwaters State Forest twice, from MP 924.7 to MP 925.2 and from MP 928.7 to MP 933.5, traversing a total of approximately 5.3 miles of forested land.

Snowmobile and ATV Trails

The proposed pipeline route would cross 15 different snowmobile trails 58 times. These trails are located throughout Minnesota, and some are located within state and national forests. The proposed Project would cross one designated-ATV trail, the Soo Line North ATV Trail in Cass County, Minnesota, at two different locations.

Douglas County Forest

The proposed pipeline would cross a portion of the Douglas County Forest near Superior, Wisconsin. Over 269,000 acres of forestland is classified as part of the Douglas County Forest. Approximately 80 percent of the county forest is commercial forest while the remaining 20 percent is brush prairies, lakes, rivers, dams, and/or marsh wetlands.

State Natural Areas/Areas of Special Natural Resource Interest

The proposed pipeline would also cross the Pokegama Carnegie Wetland Complex, a Wisconsin SNA/ASNRI. The SNA portion is located entirely within Douglas County Forest. SNAs are designated to protect and preserve areas that are outstanding examples of native natural communities, significant geological formations, and archaeological sites. These areas contain natural features that are unaltered by or have fully recovered from human activities. These areas also contain most of the state's rare plants and animals (WDNR 2009).

The proposed pipeline would also cross the Superior Airport/Hill Avenue/South Superior Triangle Wetland Complex ASNRI in Douglas County. The wetland complex lies between the Pokegama and

Little Pokegama Rivers and features extensive mosaics of wetlands that contain many rare plant species. For additional discussion of the SNA/ANSRI, see Section 4.4.

Nationwide Rivers Inventory-Listed Streams

The pipeline would cross six rivers that are listed in the NRI. Rivers listed in the NRI are river segments considered to possess one or more "outstandingly remarkable" natural or cultural value. These NRI rivers include the Pembina River in North Dakota; and the Middle River, Red Lake River, Clearwater River, Red River, and Prairie River in Minnesota.

Scenic Byways

The Alberta Clipper pipeline would cross four roadways that are designated as scenic: U.S. Highway 2, the Great River Road, the Edge of the Wilderness Scenic Byway, and the Veterans Evergreen Memorial Scenic Byway. All of these proposed crossings are in Minnesota.

U.S. Highway 2 is an east-west highway that consists of two sections: one segment from Maine to New York, and a second segment from Michigan to Washington State. The proposed pipeline would cross the scenic highway seven times between MP 932.5 and MP 1044.1 in Beltrami, Itasca, and St. Louis Counties in Minnesota.

The Great River Road is a collection of federal, state, and local roads covering 10 states. The Minnesota portion has two components: a 430-mile federally designated national route, and a 755-mile state-designated alternate route. The pipeline would cross County Highway 7 (Division Street), a federally designated segment of the route, in Beltrami County at MP 937.6. The proposed pipeline would cross another segment of the route, Itasca County Road 18, at MP 988.9 in Itasca County.

The Edge of the Wilderness Scenic Byway is a 47-mile stretch of Minnesota State Highway 38 from Grand Rapids to Effie. A large portion of the road is located within the CNF. The proposed pipeline would cross the road at MP 1007.8.

Veterans Evergreen Memorial Scenic Byway is a designated Minnesota Scenic Byway that consists of a 50-mile stretch of State Highway 23 from Banning State Park to New Duluth. The pipeline would cross this highway at MP 1082.8.

4.9.2 Potential Impacts and Mitigation

4.9.2.1 Land Use

Land use and land cover types crossed by the pipeline and associated facilities include five primary types: agricultural, wetland/open water, developed, forested, and open land. Table 4.9.2-1 presents the land use impacts associated with construction and operation of the proposed Project. As proposed, the 326.9-mile Alberta Clipper Project would disturb a total of 6,402.1 acres of land in North Dakota, Minnesota, and Wisconsin. The proposed Project would affect mainly agricultural lands (2,528.8 acres), followed by

TABLE 4.9.2-1
Acres Affected during Construction and Operation of Pipeline Facilities for the Alberta Clipper Project

	Agricultural[a]		Wetland/Open Water[b]		Developed[c]		Forested[d]		Open[e]		Total	
Pipeline Facility	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**
Pembina County, North Dakota												
Pipeline right-of-way[f]	406.8	72.9	28.9	6.2	0.0	0.0	1.3	0.2	15.6	2.8	452.6	82.1
Extra temporary workspaces	17.4	0.0	0.2	0.0	0.0	0.0	0.1	0.0	1.7	0.0	19.4	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	1.6	0.0
North Dakota subtotal	424.2	72.9	29.1	6.2	1.6	0	1.4	0.2	17.3	2.8	473.6	82.1
Kittson County, Minnesota												
Pipeline right-of-way[f]	237.5	43.1	2.3	0.4	0.3	0.1	0.0	0.0	12.2	2.2	252.3	45.8
Extra temporary workspaces	8.5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	2.0	0.0	10.9	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	35.6	0.0	0.0	0.0	0.0	0.0	35.6	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Marshall County, Minnesota												
Pipeline right-of-way[f]	517.6	93.4	25.7	5.1	1.1	0.2	10.8	1.9	23.8	4.2	579.0	104.8
Extra temporary workspaces	21.1	0.0	0.4	0.0	0.0	0.0	0.4	0.0	3.1	0.0	25.0	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	28.1	0.0	0.0	0.0	0.0	0.0	28.1	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	8.9	0.0	0.0	0.0	0.0	0.0	8.9	0.0

TABLE 4.9.2-1 (continued)
Acres Affected during Construction and Operation of Pipeline Facilities for the Alberta Clipper Project

Pipeline Facility	Agricultural[a]		Wetland/Open Water[b]		Developed[c]		Forested[d]		Open[e]		Total	
	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.
Pennington County, Minnesota												
Pipeline right-of-way[f]	251.0	45.2	35.1	7.1	0.0	0.0	14.8	2.7	17.4	3.1	318.3	58.1
Extra temporary workspaces	11.3	0.0	0.1	0.0	0.0	0.0	0.4	0.0	2.1	0.0	13.9	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	3.4	0.0
Red Lake County, Minnesota												
Pipeline right-of-way[f]	217.6	39.0	20.0	4.0	2.3	0.4	4.5	0.9	9.3	1.6	253.7	45.9
Extra temporary workspaces	13.2	0.0	0.0	0.0	0.2	0.0	0.2	0.0	1.2	0.0	14.8	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	2.5	0.0
Polk County, Minnesota												
Pipeline right-of-way[f]	149.0	26.6	30.8	6.2	0.2	0.0	10.7	1.8	42.3	7.7	233.0	42.3
Extra temporary workspaces	5.0	0.0	0.6	0.0	0.0	0.0	0.2	0.0	1.7	0.0	7.5	0.0
Pipe and contractor yards[g]	27.9	0.0	0.0	0.0	27.8	0.0	0.0	0.0	0.0	0.0	55.7	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0

TABLE 4.9.2-1 (continued)
Acres Affected during Construction and Operation of Pipeline Facilities for the Alberta Clipper Project

Pipeline Facility	Agricultural[a]		Wetland/Open Water[b]		Developed[c]		Forested[d]		Open[e]		Total	
	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.	Const.	Op.
Clearwater County, Minnesota												
Pipeline right-of-way[f]	174.1	62.1	49.2	18.8	1.5	0.8	83.5	38.7	20.3	8.6	328.6	129.0
Extra temporary workspaces	13.9	0.0	0.9	0.0	0.5	0.0	4.4	0.0	2.0	0.0	21.7	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	22.4	0.0	0.0	0.0	0.0	0.0	22.4	0.0
Beltrami County, Minnesota												
Pipeline right-of-way[f]	66.4	36.8	29.5	18.0	17.1	9.0	216.4	111.6	42.3	26.5	371.7	201.9
Extra temporary workspaces	5.8	0.0	0.0	0.0	1.5	0.0	9.5	0.0	2.8	0.0	19.6	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	40.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	50.9	0.1	0.0	0.0	0.0	0.0	50.9	0.1
Hubbard County, Minnesota												
Pipeline right-of-way[f]	11.5	7.2	17.5	10.0	2.4	1.3	73.5	36.0	24.4	16.0	129.3	70.5
Extra temporary workspaces	0.6	0.0	0.2	0.0	0.2	0.0	2.9	0.0	0.4	0.0	4.3	0.0
Pipe and contractor yards[g]	16.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	181.7	0.0	198.1	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4.9.2-1 (continued)
Acres Affected during Construction and Operation of Pipeline Facilities for the Alberta Clipper Project

	Agricultural[a]		Wetland/Open Water[b]		Developed[c]		Forested[d]		Open[e]		Total	
Pipeline Facility	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**
Cass County, Minnesota												
Pipeline right-of-way[f]	15.1	10.2	206.5	148.1	39.9	21.0	265.8	144.9	19.5	13.9	546.8	340.9
Extra temporary workspaces	0.8	0.0	3.4	0.0	1.6	0.0	13.4	0.0	1.0	0.0	20.2	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	5.1	0.0
Itasca County, Minnesota												
Pipeline right-of-way[f]	110.8	63.1	385.6	258.6	3.4	2.1	217.8	111.3	78.2	46.9	795.8	482.0
Extra temporary workspaces	8.0	0.0	2.5	0.0	0.8	0.0	9.8	0.0	3.8	0.0	24.9	0.0
Pipe and contractor yards[g]	61.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	121.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	27.3	0.3	0.0	0.0	0.0	0.0	27.3	0.3
Aitkin County, Minnesota												
Pipeline right-of-way[f]	0.0	0.0	19.3	14.4	0.0	0.0	0.0	0.0	0.0	0.0	19.3	14.4
Extra temporary workspaces	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 4.9.2-1 (continued)
Acres Affected during Construction and Operation of Pipeline Facilities for the Alberta Clipper Project

	Agricultural[a]		Wetland/Open Water[b]		Developed[c]		Forested[d]		Open[e]		Total	
Pipeline Facility	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**	**Const.**	**Op.**
St. Louis County, Minnesota												
Pipeline right-of-way[f]	28.2	15.6	245.0	175.9	0.1	0.1	101.6	59.6	35.4	20.4	410.3	271.6
Extra temporary workspaces	0.6	0.0	2.9	0.0	0.0	0.0	4.7	0.0	1.5	0.0	9.7	0.0
Pipe and contractor yards[g]	28.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.1	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	48.7	0.0	0.0	0.0	0.0	0.0	48.7	0.0
Carlton County, Minnesota												
Pipeline right-of-way[f]	97.0	52.9	128.4	90.0	0.4	0.2	132.6	75.3	40.4	25.6	398.8	244.0
Extra temporary workspaces	3.4	0.0	7.4	0.0	0.2	0.0	7.5	0.0	4.0	0.0	22.5	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	191.5	0.0	0.0	0.0	0.0	0.0	191.5	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	17.5	0.0	0.0	0.0	0.0	0.0	17.5	0.0
Minnesota subtotal	2,101.4	495.2	1,213.7	756.6	607.6	35.6	1,185.4	584.7	612.8	176.7	5,720.9	2,048.8
Douglas County, Wisconsin												
Pipeline right-of-way[f]	2.7	1.3	101.7	57.9	2.4	1.1	66.1	37.3	24.7	15.7	197.6	113.3
Extra temporary workspaces	0.5	0.0	1.7	0.0	0.0	0.0	1.6	0.0	0.6	0.0	4.4	0.0
Pipe and contractor yards[g]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump stations and delivery facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Access roads[h]	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	5.6	0.0
Wisconsin subtotal	3.2	1.3	103.4	57.9	8.0	1.1	67.7	37.3	25.3	15.7	207.6	113.3
Total	**2,528.8**	**569.4**	**1,346.2**	**820.7**	**617.2**	**36.7**	**1,254.5**	**622.2**	**655.4**	**195.2**	**6,402.1**	**2,244.2**

TABLE 4.9.2-1 (continued)
Acres Affected during Construction and Operation of Pipeline Facilities for the Alberta Clipper Project

Note: The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the exact sum of the addends in all cases. Totals may be off by 0.1 place.

[a] Agricultural land consists of lands used to grow crops or livestock, including pasture/hay, row crops, small grains, orchards, and vineyards.

[b] Wetland/open water consists of areas classified as woody wetlands, emergent herbaceous wetlands, scrub/shrub wetlands, and open water.

[c] Developed land consists of areas classified as low-intensity residential; high-intensity residential; commercial; industrial; and transportation corridors such as roads, highways, and railroads.

[d] Forested land consists classified as deciduous, evergreen, and mixed forest.

[e] Open land consists of areas classified as bare rock, sand, or clay; quarries, strip mines, or gravel pits; transitional; shrubland; grasslands or herbaceous areas; and urban or recreational grasses.

[f] Assumes a standard 140-foot-wide corridor in uplands and alternative construction areas, with a standard 125-foot-wide corridor in wetlands. Permanent right-of-way is based on a standard 25-foot wide corridor north of Clearbrook, Minnesota and a 75-foot wide-corridor south of Clearbrook. Totals from alternative construction area permanent rights-of-way are also reflected in this data.

[g] Indicates leased acreage; actual disturbed acreage may be smaller

[h] Impacts are based on an assumed 30- foot width required for movement of construction equipment for the currently proposed access roads. However, since the access roads are existing roads, reported acreages are likely an overestimate of actual impacts that would be realized during construction. Specific improvement designs are pending the completion of environmental survey and logistical evaluation.

Source: Enbridge 2009.

wetlands (1,346.2 acres) and forested lands (1,254.5 acres). The other land use types affected by the pipeline would be developed land and open land (Table 4.9.2-1). Of the estimated 6,402.1 acres affected by construction, 82.6 percent would be for the pipeline construction right-of-way and 3.4 percent for extra temporary workspaces. Most of the remaining acreage would be associated with pipe and contractor yards and access roads. All new aboveground facilities would be located within the construction right-of-way or within the footprint of an existing facility. Approximately 88 percent of the pipeline (287 miles) would be collocated with existing pipeline rights-of-way. Following construction, lands used for temporary workspaces and pipe and contractor yards would be allowed to revert to their pre-construction use type.

A total of 2,243.8 acres would be retained as the permanent right-of-way, with an additional 0.4 acre used for permanent access roads. Impacts to and potential mitigation measures for these areas are discussed throughout this section. Wetlands and forested areas are discussed in detail in Sections 4.4 and 4.5, respectively.

Pipeline Facilities

In general, Enbridge has proposed a construction right-of-way width of 140 feet. The construction right-of-way would typically be reduced to 125 feet in wetlands, although winter wetland construction would require a 140-foot-wide right-of-way. In addition to the pipeline construction right-of-way, Enbridge proposes to use extra temporary workspaces at various points along the pipeline route. The pipe generally would be installed using standard trenching methods in upland areas. Other installation techniques, such as conventional boring or HDD methods, would be used to cross some waterbodies, roads, and other areas in order to reduce construction-related impacts to these features. Section 2.4 provides a description of the different construction methods that would be utilized for the proposed Project. The state-specific EMPs (Appendix C) describe the measures that have been proposed by Enbridge to minimize construction-related impacts on the land required for the proposed Project.

Following construction, a 25-foot-wide permanent right-of-way north of Clearbrook, Minnesota and 75-foot-wide permanent right-of-way south of Clearbrook, Minnesota would be maintained by Enbridge. The permanent right-of-way may overlap other permanent rights-of-way where the pipeline is collocated with existing rights-of-way. Areas within the permanent right-of-way generally would be allowed to revert to pre-construction usage with certain restrictions. For example, no permanent structures or trees would be allowed within the permanent right-of-way. Use of the land for cultivation and pasture could resume after construction. Uncultivated areas would be maintained with an herbaceous cover. In general, periodic maintenance procedures would prevent forested areas from recovering within the permanent right-of-way during operation of the proposed Project.

Additional Aboveground Facilities

The proposed Project would include 32 new mainline valves, all but four of which would be constructed at existing pump stations; new pumps at three existing stations; and new piping, one launcher, two receivers, booster pumps, and storage tanks at an existing pump station.

In general, the new aboveground facilities proposed by Enbridge would be located within the affected acreage of other facilities (e.g., pig launchers and receivers would be located within pump stations) or would be located entirely within the 75-foot-wide permanent right-of-way (mainline valves). All but four of the valves would be installed in areas near mainline valves of other Enbridge pipelines. The location of each existing aboveground facility is provided in Section 2.2.3.

Access Roads

Enbridge proposes to access most of the Project area using existing roads. At present, approximately 128 existing access roads have been identified, which total an estimated 198.1 acres (see Table 4.9.2-1). The length of these existing access roads ranges from less than 0.1 mile to 9.9 miles.

At the time of the DEIS, DOS had requested that Enbridge provide complete information on all access roads, including location length, width, acres of impact by land type, and road construction improvement methods. In April 2009, Enbridge provided its updated list of access roads; however, some details on road widths and potential improvements/modifications are still pending the completion of environmental surveys and logistical evaluation. Enbridge has indicated that some minor modifications to access roads may be needed, but any modifications to access roads would be minor and would not alter impact acres significantly. Therefore, this analysis assumed a standard width of 30 feet to generate potential acres of impact. Given the use of existing roads, it is likely that the acres of impact reported in Table 4.9.2-1 are an overestimate.

As discussed above, all but four of the mainline valves would be installed in areas near mainline valves of other Enbridge pipelines. Three of these four mainline valves would require access via non-public access roads (MP 926.5, MP 989.7, and MP 1008.7). The fourth mainline valve (MP 970.4) would be accessed via an existing public road. Currently, these are the only access roads that have been identified for use during operation of the proposed pipeline. These roads would permanently impact 0.4 acre of developed land and would be used to gain access to the mainline valve locations. Enbridge is still evaluating the potential for additional permanent access road locations.

Land Use by County and State

The primary land use types impacted by the Alberta Clipper Project are agricultural, wetland, and forested lands. Combined, they account for 80.1 percent of the total acres of construction-impacted land. The other two types of land use affected are open land and developed land. Table 4.9.2-1 shows affected land use acreages by state and county for the Alberta Clipper Project.

Approximately 89.6 percent of the land impacted in North Dakota during construction would be agricultural, with only small amounts of forested, developed, and wetlands impacted.

The majority of the pipeline length and thus the land use impacts would be located in Minnesota on agricultural lands, forested lands, and wetlands. Approximately 36.7 percent of the acres that would be impacted in Minnesota during construction are agricultural lands, while 21.2 and 20.7 percent are wetlands and forested lands, respectively. Dominant land use types that would be impacted by the proposed Project vary among the counties. In general, the Minnesota counties north of Clearbrook are dominated by agricultural lands while those counties south of Clearbrook are dominated by forested lands. Most of the wetland impacts throughout the region of influence are in Minnesota and are located in counties that are south of Clearbrook.

The Alberta Clipper Project would cross primarily wetlands and forested lands in Wisconsin. Wetlands would account for 49.8 percent (103.4 acres) and forested lands would make up 32.6 percent (67.7 acres) of the acreage impacted during construction. Wetland impacts are discussed in further detail in Section 4.4.3.

Ownership

Approximately 73.1 percent of the land crossed by the Project is considered private land (4,043.3 acres). The remaining land crossed by the Project would be distributed among federal, state, county, and municipal lands (Table 4.9.2-2). The total acreage of affected federal land is approximately 320.9 acres, and total affected acreage of state and county land is 928.8 acres (Table 4.9.2-3). Negotiated easements would be used to confer rights-of-way by a landowner to the Applicant, on either a permanent or temporary (usually for construction) basis. The easement would give Enbridge the right to construct, operate, and maintain the pipeline within a permanent or temporary right-of-way. In return, Enbridge would compensate the landowner for use of the land. Typically, easement agreements between a company and landowner would specify compensation for loss of use during construction, loss of resources, and damage to the property, and would specify allowable uses for the permanent right-of-way after construction is completed.

If an agreement during negotiations between Enbridge and a landowner cannot be reached, Enbridge may utilize state eminent domain to acquire the needed easements. State laws define the prerequisites under which eminent domain may be used and define the eminent domain process for each state. DOS does not have any eminent domain authority.

All of the land that would be crossed by the proposed Project in North Dakota is privately owned.

In Minnesota, private ownership comprises 71.1 percent (203.1 miles) of lands that would be crossed by the proposed Project, and state and federal land comprises 25.1 percent of the crossed land (Table 4.9.2-3). In most of the Minnesota counties, the land that would be crossed is predominately privately owned. The exceptions are Hubbard, Cass, and Aitkin Counties. Approximately 69.6 percent of the miles crossed in Hubbard County is state and county land. In Cass County, about 55.3 percent of the miles that would be crossed is federally owned, and 29.5 percent is state and county owned. All of the land that would be crossed in Aitkin County is state land.

In Wisconsin, private ownership accounts for approximately 61.8 percent of land along the pipeline alignment. County land accounts for 23.7 percent, while municipal lands make up the remaining 14.5 percent.

As noted, Enbridge would negotiate easements with private landowners for the temporary and permanent rights-of-way. Where the pipeline would traverse federal land, all applicable federal statutes would apply. The Alberta Clipper Project would cross about 18.9 miles of federally owned land (320.9 acres), all of which is in Minnesota. In areas where the pipeline would traverse state land, all applicable state statutes would apply. The Alberta Clipper Project would cross approximately 55.8 miles of state-or county-owned lands (928.8 acres).

TABLE 4.9.2-2 Ownership of Land Crossed by the Alberta Clipper Project		
Land Owner[a]	**Miles Crossed[b]**	**Percent of Total (%)**
NORTH DAKOTA		
Pembina County		
Federal	0.0	0.0%
State[c]	0.0	0.0%
Municipal	0.0	0.0%
Private	28.0	100.0%
MINNESOTA		
Kittson County		
Federal	0.0	0.0%
State[c]	0.0	0.0%
Municipal	0.0	0.0%
Private	15.4	100.0%
Marshall County		
Federal	0.0	0.0%
State[c]	0.0	0.0%
Municipal	0.0	0.0%
Private	35.1	100.0%
Pennington County		
Federal	0.0	0.0%
State[c]	0.0	0.0%
Municipal	0.0	0.0%
Private	19.7	100.0%
Red Lake County		
Federal	0.0	0.0%
State[c]	0.0	0.0%
Municipal	2.8	17.9%
Private	12.8	82.1%
Polk County		
Federal	0.0	0.0%
State[c]	0.0	0.0%
Municipal	1.8	12.9%
Private	12.2	87.1%

TABLE 4.9.2-2 (continued) Ownership of Land Crossed by the Alberta Clipper Project		
Land Owner[a]	**Miles Crossed**[b]	**Percent of Total (%)**
Clearwater County		
Federal	0.0	0.0%
State[c]	0.6	2.9%
Municipal	0.1	0.5%
Private	20.2	96.7%
Beltrami County		
Federal	0.0	0.0%
State[c]	8.5	37.1%
Municipal	2.0	8.7%
Private	12.4	54.1%
Hubbard County		
Federal	0.0	0.0%
State[c]	5.5	69.6%
Municipal	0.0	0.0%
Private	2.4	30.4%
Cass County		
Federal	18.9	55.3%
State[c]	10.1	39.5%
Municipal	1.6	4.7%
Private	3.6	10.5%
Itasca County		
Federal	0.0	0.0%
State[c]	14.2	28.2%
Municipal	2.8	5.6%
Private	33.3	66.2%
Aitkin County		
Federal	0.0	0.0%
State[c]	1.1	100.0%
Municipal	0.0	0.0%
Private	0.0	0.0%

TABLE 4.9.2-2 (continued) Ownership of Land Crossed by the Alberta Clipper Project		
Land Owner[a]	**Miles Crossed[b]**	**Percent of Total (%)**
St. Louis County		
Federal	0.0	0.0%
State[c]	7.8	31.6%
Municipal	0.0	0.0%
Private	16.9	68.4%
Carlton County		
Federal	0.0	0.0%
State[c]	4.9	20.4%
Municipal	0.0	0.0%
Private	19.1	79.6%
Minnesota Subtotals		
Federal	18.9	6.6%
State[c]	52.7	18.4%
Municipal	11.1	3.9%
Private	203.1	71.1%
WISCONSIN		
Douglas County		
Federal	0.0	0.0%
State[c]	3.1	23.7%
Municipal	1.9	14.5%
Private	8.1	61.8%
Alberta Clipper Project Totals		
Federal	18.9	5.8%
State[c]	55.8	17.0%
Municipal	13.0	4.0%
Private	239.2	73.2%

[a] The reservations are included in the Private ownership category, except for the 33.1 miles where the Leech Lake Reservation and the CNF, which are classified as Federal.

[b] The miles reported above do not include horizontally directionally drilled or guided bore locations.

[c] Includes both state- and county-owned lands.

Source: Enbridge 2009.

TABLE 4.9.2-3
Ownership of Acres Affected during Construction by the Alberta Clipper Project[a]

Location	Federal	State	Municipal	Private	County
North Dakota					
Pembina	0.0	0.0	0.0	471.8	0.0
Minnesota					
Kittson	0.0	0.0	0.0	262.8	0.0
Marshall	0.0	0.0	0.0	603.3	0.0
Pennington	0.0	0.0	0.0	332.1	0.0
Red Lake	0.0	0.0	43.4	225.0	0.0
Polk	0.0	0.0	30.4	210.1	0.0
Clearwater	0.0	0.0	2.7	336.9	10.8
Beltrami	0.0	9.1	36.7	207.3	137.9
Hubbard	0.0	19.4	0.0	46.1	68.2
Cass	320.9	159.4	24.1	58.1	4.7
Itasca	0.0	53.4	46.5	546.1	175.4
Aitkin	0.0	0.1	0.0	0.0	19.2
St. Louis	0.0	6.5	0.0	286.2	127.7
Carlton	0.0	53.7	0.0	328.7	39.1
Wisconsin					
Douglas[b]	0.0	0.0	28.9	128.8	44.2

[a] The acres reported above do not include horizontally directionally drilled or guided bore locations. Therefore, the total acres of affected lands are less than the total acres of the pipeline reported in Table 4.9.2-1. The reservations are included in the Private ownership category, except for the area within the Leech Lake Reservation and the Chippewa National Forest, which are classified as Federal.

[b] Ownership of the land occupied by the Pokegama Carnegie Wetland Complex is considered to be Douglas County land

Source: Enbridge 2009.

Agricultural Land

Construction and operation of the Alberta Clipper Project would affect about 2,528.8 acres of agricultural land. Approximately 2,358.8 of these acres are considered prime farmland by NRCS (including land considered potential prime farmland).

The principal crops along the pipeline route include grain corn, soybeans, wheat, barley, sunflowers, dry beans, canola, alfalfa, hay, sugar beets, and potatoes. There are also two organic farms along the pipeline route. In addition to crop lands, there are also lands that contain livestock such as cattle, horses, buffalo, and sheep.

Construction activities could result in impacts to agricultural lands, including soil erosion, interference with and damage to agricultural surface and subsurface drainage and irrigation systems, mixing or loss of

fertile topsoil and subsoil, and soil compaction. Reduced productivity of the agricultural land or direct crop loss also could occur.

During preliminary stakeholder consultations, the agricultural issues that were of most concern were soil compaction and construction width, impacts to drain tiles, minimizing the spread of noxious weeds, and concern of the pipeline rising over time. For previous pipeline projects in the area, concerns related to construction impacts to agricultural lands included loss of agricultural activities, impacts to irrigation systems, access to farmland, effects on farmers eligible for special programs and benefits through FSA, and effects on landowners with CRP lands.

To address potential impacts to agricultural lands, Enbridge has proposed a number of mitigation measures that are detailed in its AMP (Appendix F). The purpose of the AMP is to identify actions to mitigate, avoid, or provide compensation for impacts to agriculture due to construction of the Alberta Clipper pipeline. After construction, Enbridge would repair or restore drain tiles, fences, and land productivity as these may be damaged during the construction process. After construction, agricultural land could revert to its previous uses, except for land that would be set aside for permanent access roads; Enbridge would directly purchase such land from individual landowners. Although agricultural land would be able to revert to its previous use, the magnitude of construction and operational impacts could include changes in agricultural use or even conversion to a non-agricultural use at a landowner's request. Typical measures in the AMP (Appendix F) to avoid or minimize many common issues and problems associated with construction in agricultural lands include:

- Avoid or restrict construction activities in excessively wet soil conditions as determined by the agricultural monitor to minimize impacts to soil compaction, rutting, and future production;
- Provide a minimum of 24 hours notice to the landowner before accessing property for construction purposes;
- Replace topsoil so that, after settling occurs, the original depth and contour of the topsoil is achieved;
- Supply Enbridge contact information to affected landowners at least 45 days prior to construction;
- Establish with the landowner an acceptable amount of time that an irrigation system may be out of service due to pipeline construction and reasonably compensate the landowner for any losses incurred due to irrigation disruption;
- Implement measures to allow for irrigation to continue during pipeline construction when feasible and mutually agreeable to Enbridge and the landowner;
- Install the pipeline at a sufficient depth to allow for ongoing maintenance of drainage ditches and restore the ditch to pre-construction configuration after construction;
- Reestablish all original contours and drainage patterns following construction;
- Prevent excessive soil erosion on lands disturbed by construction; and
- Build temporary roads as necessary and design them to minimize impacts on agriculture.

All drainage ditches crossed by the pipeline would be treated as "waters of the state," and all mitigation measures would follow those established for other waterbodies. A detailed discussion of these mitigation measures can be found in Section 4.3.

During the comment period, landowners raised concerns about compliance with and implementation of the measures in the AMP (Appendix F) by Enbridge contractors. Enbridge has committed to implementing a comprehensive inspection, monitoring, and compliance control plan to ensure that multiple contractors comply with the conditions of the permits and EIS. This includes employing at least three Environmental Inspectors per spread to conduct oversight of pipeline construction as well as funding third-party inspectors, approved by state and or federal agencies, who would be assigned to each construction spread to oversee the contractors and Enbridge Environmental Inspectors. Further, Enbridge has constructed a Complaint Handling Procedures Plan (Appendix X) to ensure that all landowner concerns are handled appropriately.

At the time of the DEIS, DOS recommended that Enbridge update its AMP, as requested by Minnesota agencies, to be consistent with mitigation measures set forth in the MinnCan Project AMP. Since the issuance of the DEIS, Enbridge has applied for and received its MPUC Routing Permit. Part of the permit application process was a review of the Enbridge AMP by the Minnesota Department of Agriculture. This AMP was accepted by Minnesota through their permitting process and has been deemed sufficient. Finally, while neither North Dakota nor Wisconsin[5] requires an AMP, Enbridge has committed that construction practices and mitigation measures set forth in their AMP (Appendix F) would be applied to agricultural lands in these states, except where these practices deviate from state or local agency requirements or permit details.

Following construction, all agricultural land would be restored to pre-construction condition. Enbridge would compensate all landowners for lost crops and any documented damage that may be caused by construction activities. All negotiations between Enbridge and the affected landowner or tenant would be voluntary and in accordance with the terms of the easement. Construction impacts to general agricultural activities are expected to be minor and temporary; operations impacts would be minor but permanent.

Numerous cattle, horse, sheep, and other livestock farms are crossed by the proposed pipeline. Enbridge has developed site-specific construction measures to minimize impacts to livestock and grazing areas. These measures include erecting temporary fences, temporarily relocating livestock, reconstructing any stock ponds impacted, maintaining temporary access across trenches for passage of livestock, and reseeding with owner-approved seed mixtures suitable for livestock grazing. Organic farmland would be crossed by the proposed pipeline at MP 904.4 and MP 905. In addition to the requirement of the Minnesota PUC that Enbridge employ a qualified organic consultant, Enbridge's AMP (Appendix F) describes mitigation actions for affected organic agricultural land. These measures include developing site-specific construction practices to minimize the potential of decertification of the land; avoiding the use of any herbicides, pesticides, fertilizers, or seeds; soil handling procedures; erosion control methods; and weed control methods. Enbridge would compensate the landowner for any land decertified due to construction.

Four tracts of land would be crossed that contain specialty crops and would require special crossing and mitigation measures. Honey bees have been identified between MP 859.05 and MP 859.4 and from MP 886.5 to MP 886.6. Enbridge would work with landowners to ensure that hives are outside the construction right-of-way. Two other specialty crop tracts contain edible beans. Enbridge would compensate the landowners for any crop loss.

The following is a detailed description of the agricultural impacts of most concern and the mitigation measures that would be implemented by Enbridge.

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5 Wisconsin requires Agricultural Impact Mitigation Agreements for projects subject to siting permits only. The proposed Project is not subject to a siting permit in Wisconsin.

Soil Compaction

Due to construction activities, some agricultural lands could be affected by soil compaction and reduced productivity of their land. Enbridge identified 120 acres of land crossed by the Project that could be prone to compaction. As stated in the AMP (Appendix F) and the state-specific EMPs (Appendix C), the land would be plowed using the appropriate deep-tillage and draft equipment after construction is complete to mitigate any cropland that has been compacted. Alleviation of topsoil compaction activities would occur only during suitable weather condition. If conditions are so wet that alleviation efforts would cause more damage, the activity would be suspended and completed during favorable conditions.

An increase in invasive, non-native vegetative species in these areas would be minimized as described in the state-specific EMPs (Appendix C), AMP (Appendix F), and Noxious Weed Plans (Appendix H), including cleaning of all equipment before coming on-site and minimizing the time between final grading and permanent seeding. Section 4.2.2.1 provides additional discussion on soil impacts.

Windbreaks, Shelterbelts, and Living Snow Fences

The Alberta Clipper Project would intersect numerous tracts of land containing windbreaks and shelterbelts. Enbridge has evaluated each of these areas and has proposed specific mitigation measures for each location. Some of the mitigation measures that Enbridge has proposed are:

- Reduce the width of the construction right-of-way (neck down);
- Replant trees that were removed;
- Compensate the landowner for trees removed during construction;
- Transplant trees to a different part of the windbreak not affected by pipeline construction/maintenance; or
- Re-route the pipeline or relocate additional workspace to an open area.

Not all of the measures listed above would be implemented at every location. Enbridge would coordinate with each landowner to implement appropriate site-specific measures.

Conservation Reserve Program Lands

The proposed pipeline would cross five parcels of CRP lands in North Dakota. Approximately 16.3 acres would be in the construction right-of-way, and 2.9 acres would be in the permanent right-of-way. The proposed pipeline would cross 63 parcels of CRP lands in Minnesota. A total of 257.7 acres would be located in the construction right-of-way in Minnesota, of which 46.6 acres would be in the permanent right-of-way. No CRP lands would be crossed in Wisconsin.

Enbridge would restore all CRP lands that were impacted during construction, including any CRP land in the permanent right-of-way. All CRP lands would be restored to their pre-construction condition to allow the acreage to maintain CRP status.

Other FSA and NRCS Programs

The FSA and NRCS administer numerous other conservation programs, including the WRP. The WRP is a voluntary program to restore wetlands that are located on private property. The program is administered by NRCS in consultation with the FSA. To be eligible, the landowner must have owned the land for at least 1 year, the land must be restorable, and the land must be used for wildlife purposes (NRCS 2008).

Enbridge identified two parcels of WRP lands in North Dakota that would be crossed by the pipeline. Approximately 8.5 acres would be located in the construction right-of-way, of which 1.8 acres would be located in the permanent right-of-way. No WRP lands would be crossed by the pipeline in Minnesota or Wisconsin. Potential impacts to WRP parcels also are discussed in Section 4.4.2.3.

NRCS also administers the EWP Program. Enbridge identified two parcels of EWP lands in North Dakota that would be crossed by the pipeline. Approximately 8.5 acres of EWP land would be located in the construction right-of-way, of which 1.5 acres would be located in the permanent right-of-way. No EWP lands would be crossed by the pipeline in Minnesota or Wisconsin.

Enbridge would restore all EWP and WRP lands in the construction and permanent rights-of-way to allow the land to remain in the WRP and EWP Program.

Open Land

Approximately 10.2 percent of the pipeline route would cross non-agricultural open land. Most of this open area is existing right-of-way or empty fields. Construction of the Alberta Clipper Project would affect approximately 655.4 acres of open land. The affected open land would include 17.3 acres in North Dakota, 612.8 acres in Minnesota, and 25.3 acres in Wisconsin.

Construction would require clearing of herbaceous plants and shrubs on the right-of-way and work areas. Clearing of these shrubs and plants would result in some minor impacts; however, many of the herbaceous plant species would be expected to re-colonize quickly following construction. Enbridge would reseed and mulch upland open land areas after construction is completed. For a detailed description of impacts and mitigation measures to herbaceous cover, refer to Section 4.5.

Forested Land

Construction and operation of the Alberta Clipper Project would affect approximately 1,254.5 acres of forestland, which represents approximately 19.6 percent of the total acres affected by the Project. Approximately 1.4 acres would be located in North Dakota, 1,185.4 acres in Minnesota, and 67.7 acres in Wisconsin. Forest vegetative types are discussed in Section 4.5.

The Alberta Clipper Project would cross approximately 765.0 acres of forested wetlands over its entire length, including 746.3 acres in Minnesota and 18.6 acres in Wisconsin. Table 4.4.3-1 details the numbers of acres of forested wetlands that would be affected during construction and operation of the pipeline. Wetlands impacts and mitigation are discussed in Section 4.4.

During construction, trees and brush from forested areas would be cleared. Of the total 1,254.5 total acres of forested land impacted by construction, approximately 632.3 acres would be able to revert to pre-existing cover types. The remaining 622.2 acres would be in the permanent right-of-way and would be converted to and maintained as shrub and herbaceous cover, resulting in a permanent loss of trees in this area.

To minimize damage to trees adjacent to the construction right-of-way, clearing crews would be required to fell trees toward the center of the right-of-way. Cleaning crews would mow, chip, mulch, or haul off all wood. Tree stumps that are located outside of the ditch line would be ground to no less than 4 inches below normal ground surface. They also may be removed completely and hauled off site. Tree stumps that are located in the ditch line would be completely removed, ground, or hauled offsite. Larger depressions created by the removal of stumps would be filled and leveled, to the extent practical, to match the adjacent ground surface. In no case would wood be disposed of in agricultural areas or wetlands, or

by placing it off of the right-of-way. Enbridge would confirm with the landowner whether potentially toxic plant species are present and, if encountered, the landowner's preference for handling of this material. Any woody debris that is chipped or mulched and not hauled offsite may be windrowed, if acceptable to the landowner. Woody debris may be burned only if the contractor has acquired all applicable permits and approvals and in accordance with federal, state, tribal, and local laws. Per Enbridge's agreement with the landowner, Enbridge would work with a qualified forestry expert to select the appropriate tree species and to replant the temporary workspace with woody species following construction of the Alberta Clipper pipeline. See Section 2.4.2.2 for a discussion of forest construction methods and mitigation measures. Appendix U discusses forest impacts and mitigation issues as they pertain to the CNF.

The pipeline would also cross forestland in Wisconsin that is enrolled in the FCL or MFL program. For more information on MFL and FCL program lands, refer to Section 4.5.

Although implementation of these measures would reduce impacts of pipeline construction on forested land, impacts would still be incurred in the areas within the permanent right-of-way that would not be allowed to revert to pre-construction cover. Even in areas that would be able to revert to forested land, complete recovery of these areas could require decades. Therefore, pipeline construction in forested areas would cause a long-term, localized impact to forested land. Section 4.5 describes potential impacts to forests and applicable mitigation measures.

Developed Land

The Alberta Clipper Project would cross approximately 6.1 miles of developed land. Enbridge identified approximately 322 potential residences within 500 feet of the proposed Alberta Clipper Project pipeline route. Of these 322 residences, 61 originally were identified as within 50 feet of the proposed construction work areas. Enbridge has been involved in easement negotiations with the landowners of these properties. Numerous mitigation measures have been identified, including:

- Reducing the width of workspaces and/or pipes;
- Implementing minor route changes;
- Moving residences to another location on the parcel; and
- Purchasing the residence or negotiations for purchase (this measure is ongoing).

Because of these mitigation measures, only 21 residences remain within 50 feet of the construction right-of-way. The majority of residences and residential land within approximately 50 feet of the construction right-of-way would be along the Cass Lake, Bemidji, Grand Rapids, and Superior portions of the pipeline route.

The pipeline route also would cross multiple industrial areas, including 10 existing Enbridge pump stations and the Rajala Timber Company.

The primary impacts to most residential areas from construction activities would be disturbance of landscaping and increases in noise and dust. To reduce construction-related impacts, Enbridge has developed site-specific construction and mitigation plans for construction activities near residential and commercial structures. Some of the mitigation measures include:

- Notifying landowners prior to the start of construction;
- Posting warning signs as appropriate;

- Reducing the construction right-of-way width, if feasible, by reducing work crews, reducing extra workspaces, or adjusting construction techniques;
- Removing fences, sheds, and other improvements as necessary for protection from construction activities;
- Preserving mature trees and landscaping to the extent possible;
- Fencing the edge of the construction work area adjacent to a residence;
- Limiting the hours of construction activities with high-decibel noise levels;
- Limiting dust impacts through prearranged work hours and implementing dust minimization techniques;
- Ensuring that construction proceeds quickly through residential and developed areas;
- Cleaning up construction trash and debris daily;
- Fencing or plating open ditches during non-construction activities; and
- Restoring all lawn areas, shrubs, specialized landscaping, fences, and other structures consistent with their pre-construction appearance when construction has been completed.

For further discussion and detailed descriptions of potential noise and air impacts and mitigation measures, refer to Section 4.12.

During the DEIS comment period, landowners raised concerns regarding quality control and oversight of the contractors working on their property. Specific concerns included unauthorized use of private driveways, extended periods of disruption of utility services, and unlawful use of ATVs along the right-of-way and on adjacent private lands.

Enbridge would implement a comprehensive inspection, monitoring, and compliance control plan to ensure that multiple contractors comply with the conditions of the permits and this EIS, in addition to binding its contractors through work contracts to comply with Project regulatory requirements. Further, the Applicant has committed to employ at least three Environmental Inspectors per construction spread to conduct oversight of pipeline construction. In addition, Enbridge would fund the hiring of a third-party inspector, approved by state and/or federal agencies, per construction spread to oversee the contractors and Enbridge Environmental Inspectors. Finally, Enbridge has constructed a Complaint Handling Procedures Plan (Appendix X) to ensure that all landowner issues are handled appropriately. Specific details on enforcement of each issue are outlined below.

In order to prevent unnecessary impacts to private driveways and roads, access to the construction right-of-way by Enbridge contractors would be restricted to public roads and approved access roads. All access roads would be signed in the field and communicated to the contractors. Contractors would not be allowed to use private driveways unless previously authorized by the landowner.

Temporary interruption of utilities is not uncommon during construction of projects of this nature; however, Enbridge has committed to coordinating pipeline activities in advance to ensure the ongoing availability of utility services to the extent practical. Where disruptions of utility services cannot be avoided, Enbridge or its contractors would coordinate with landowners to minimize the evacuation period.

In the case of unlawful use of ATVs on the right-of-way and adjacent private lands, Enbridge has committed to work with landowners, in coordination with local authorities, to restrict access to the

permanent right-of-way and associated access to adjacent private lands via the right-of-way, outside of existing trail systems. This commitment would extend beyond the construction period, as it is in the Applicant's best interest to limit access to the right-of-way.

Given these commitments by Enbridge, along with the mitigation plans referenced throughout this EIS that would minimize the impacts of the Project on residences, construction-related impacts are expected to be minor and temporary.

Operation of the pipeline has the potential to impact residential properties and landowners. Structures would not be permitted on the permanent right-of-way, and trees would not be allowed to re-grow within the pipeline right-of-way. This permanent easement on residential properties would be considered a permanent impact in that it restricts the use of that portion of the property. This limited use would be accounted for in the easement negotiations between individual landowners and Enbridge. Pump stations would emit noise for the life of the station. For a further discussion of noise impacts, see Section 4.12.

Enbridge contacted planning and development departments in each of the counties that would be crossed by the proposed Alberta Clipper Project to determine whether any residential or commercial development is planned within 0.25 mile of the proposed construction right-of-way. Planned development projects include those that are permitted and not yet constructed and those with permit applications that have been filed but have not yet been approved. Enbridge identified four possible or planned developments within 0.25 mile of the right-of-way. In Pennington County, Minnesota there is a potential development near MP 864.5. At the time of this EIS, the construction of the development had not yet begun and no construction schedule was identified. At MP 937.8 (Beltrami County, Minnesota), the developer has a drawing for the development that has not yet been approved. At the third potential development (MP 941.9 in Beltrami County, Minnesota), Enbridge has an encroachment agreement for a retention pond dated July 2007. The fourth possible development is in Douglas County, Wisconsin at MP 1096.3. The developer has preliminary plans for a housing development; however, nothing has been filed with the state or county. Enbridge has secured an easement on the property that the developer would build around.

Wetlands

Construction of the pipeline in most wetlands would be similar to construction in uplands, although some specialized construction techniques may be used in some areas (See Section 2.4.3.1). A detailed discussion of wetland impacts and mitigation measures is provided in Section 4.4.

Construction methods and post-construction restoration measures have been designed to allow the parcels to maintain any existing easement status, such as CRP, WRP, or EWP Programs, using the methods outlined in the state-specific EMPs (Appendix C) and Revegetation and Restoration Monitoring Plans (Appendix K).

Pipeline operation is not anticipated to affect wetland easements. Maintenance of vegetation would not be conducted over the full width of the permanent right-of-way in these wetland areas. Therefore, no permanent impacts to wetland easements are anticipated.

4.9.2.2 Recreation and Special Interest Areas

General Recreation Activities

For recreation areas and special management areas, the Alberta Clipper Project would be expected to cause some temporary impacts during construction. Clearing of trees, noise, dust, and limited access may prevent recreational activities from occurring. Users of these areas such as hikers, wildlife enthusiasts,

sightseers, bikers, and other recreationalists may be prevented from use of the immediate area around the temporary right-of-way during construction. Enbridge would consult with the appropriate federal, state, and tribal agencies to mitigate and reduce impacts to these areas. Direct access to areas such as boat ramps, swimming access points, and fishing points may be temporarily limited or restricted due to increased traffic or road closures during construction. For an in-depth discussion of transportation impacts and mitigation measures, refer to Sections 4.10.1.7 and 4.10.2.

The level of impact within recreation areas would depend on such factors as crossing methods, length of crossing, and proximity of the right-of-way to recreation activities.

Leech Lake Reservation and Chippewa National Forest

The proposed pipeline would cross approximately 42.7 miles of the reservation. The reservation would be primarily crossed using the open-cut construction method, including potential winter construction. Most of the reservation is within the boundaries of the CNF.

The area of the CNF crossed by the proposed pipeline is completely within the LLR. Therefore, all impacts to the CNF would also be impacts to the reservation. The proposed pipeline would cross 34.1 miles of the CNF. Enbridge would implement specific mitigation measures, developed in consultation with the Forest Service, to avoid and minimize impacts to the CNF. For a detailed description of impacts and mitigation measures within the LLR and CNF, refer to Appendix U.

Fond du Lac Reservation

The proposed pipeline would cross approximately 12.9 miles of the FDL Reservation, impacting 224.1 acres during construction and permanently impacting 154.8 acres. The entire length of the pipeline through the reservation would be collocated with an existing pipeline.

Enbridge has completed cultural resources surveys within the reservation. Results and discussion of the cultural resources can be found in Section 4.11. A discussion of the impacts to wildlife species within the reservation are discussed in Section 4.6. Enbridge is working closely with FDL to develop site-specific mitigation and minimization measures for reservation lands.

Nationwide Rivers Inventory-Listed Streams

For the Pembina, Middle, Red Lake, Red, and Prairie Rivers, Enbridge proposes using HDD crossing methods to prevent any disturbance of these NRI rivers during construction. The proposed pipeline route would cross Clearwater River at two locations: one north of Clearbrook at MP 875.4, and one south of Clearbrook at MP 922.3. Enbridge would use the HDD method for the northern crossing and anticipates using the open-cut method for the southern crossing. Previous attempts to cross the Clearwater River at the southern location using HDD failed due to the existence of subsurface glacial erratics. A geotechnical analysis conducted in 2007 showed the presence of substantial boulders that could cause HDD failure. Enbridge would consult with NPS, MDNR, and the COE during the course of permitting to determine the appropriate mitigation measures to protect the outstanding resource values at this location.

To minimize impacts to NRI-listed streams, Enbridge would implement the measures described in the state-specific EMPs (Appendix C) and the Construction Environmental Control Plan (Appendix M). Enbridge also would follow recommendations made by FWS and NDDH. Measures would include limiting the duration of construction and equipment operation within waterbodies and avoiding construction during peak fish spawning season. Any disturbed areas at crossings would be restored when

pipeline installation is complete. Additional information on waterbody crossings is provided in Sections 2.4.3.2, 4.3, and 4.7.

Scenic Byways

The Alberta Clipper pipeline would cross four designated scenic roadways: U.S. Highway 2, the Great River Road, Edge of the Wilderness Scenic Byway, and the Veterans Evergreen Memorial Scenic Byway.

To avoid disruption of the roadway and traffic flow, Enbridge proposes to use boring construction techniques to cross each scenic byway. All remediation measures that may be needed would be addressed during the standard permitting process. Impacts would be short term and would occur only during construction.

State Natural Areas / Areas of Special Natural Resource Interest

The proposed pipeline would cross the Pokegama Carnegie Wetlands from MP 1090.8 to MP 1094.0. Enbridge has identified an alternative construction configuration through the Pokegama Carnegie Wetland Complex to minimize impacts to the wetlands within the area. Enbridge also has developed a Pokegama CRM Plan for crossing the Pokegama Carnegie Wetland Complex (Appendix T). From MP 1090.6 to MP1093.2, Enbridge is proposing to install the new pipeline on the north side of the existing corridor. Between MP 1090.6 and MP 1093.8, Enbridge would reduce the spacing between the pipelines from 25 to 20 feet. The original 25-foot buffer to be maintained north of the Alberta Clipper pipeline would be reduced to 20 feet. By installing the pipeline to the north, reducing the spacing between pipelines, and reducing the operation buffer, Enbridge would reduce the originally proposed permanent right-of-way from 50 to 10 feet.

The proposed pipeline would also cross the Superior Airport/Hill Avenue/South Superior Triangle Wetland Complex ASNRI in Douglas County. For more information on SNAs and ASNRIs, refer to Section 4.4.

Douglas County Forest

The Douglas County Forest would be crossed from MP 1090.6 to MP 1093.8. The Pokegama CRM Plan has been developed for the portion of the forest containing the Pokegama Carnegie Wetland Complex (Appendix T). Recreational activities such as hiking, biking, and camping could be interrupted during construction of the proposed Project. Following construction, any tree clearing that occurred would result in long-term impacts to the forest. See Section 2.4.2.2 for a discussion of forest construction methods and mitigation measures for these lands, as well as other forestlands enrolled in the Forest Crop and Managed Forest Law Programs.

State Forests

The proposed pipeline would cross the Mississippi Headwaters, Fond du Lac, and Bowstring State Forests. All three state forests would generally be crossed using the open-cut construction technique. The proposed pipeline would cross approximately 29.6 miles of the Bowstring State Forest, with construction temporarily affecting 505.1 acres of land and permanently impacting 232.9 acres of land during operation. In the Mississippi Headwaters State Forest, approximately 92.2 acres of land would be impacted during construction. During operations, 43.0 acres would be permanently impacted over the 5.4 miles of land that would be crossed by the pipeline. Approximately 2.5 miles of the Fond du Lac State Forest would be crossed by the proposed Project.

Within these three state forests, recreational activities such as camping, hiking, biking, and hunting could be temporarily interrupted during construction of the pipeline. In areas where trees and forest vegetation are cleared, recreational experiences and activities may be diminished due to the lack of forest vegetation on the permanent right-of-way. Enbridge anticipates that mitigation measures to be implemented on state forest crossings would include compensation for timber removal, visual screening plantings, and/or reestablishing vegetation using special seed mixes.

Specific impacts and mitigation for other forested lands can be found in Section 4.5. Permanent clearance of forestland and woodlands would result in permanent but localized impacts on recreation resources. The state-specific EMPs (Appendix C) contain detailed construction, mitigation, and restoration measures that would be implemented by Enbridge in forested lands. See Section 2.4.2.2 for more details on construction procedures in forestlands.

Enbridge will continue to meet with forest managers regarding any construction or restoration measures that may be needed. The majority of the pipeline route follows Enbridge's existing right-of-way, which would limit the amount of new forestland that would be impacted. However, clearance of some woodland would occur, which would cause a permanent but localized impact in forested areas that would remain throughout the operational life of the pipeline.

Snowmobile and ATV Trails

The proposed Project would cross various snowmobile trail systems 58 times. Of the 58 crossings, 14 are located within areas where winter construction activities would occur. Prior to construction, Enbridge would contact local clubs to inform them when construction would occur for each crossing. Enbridge would post signs around the area to inform local residents and trail users of the construction activities in proximity to these trails. In general, construction of the proposed Project would not impede use of these trails. The primary activities that would impact use of the trails would be associated with the presence of construction equipment or trenching activities associated with installation of the pipeline. Enbridge has committed to assist riders in finding a safe path around these impediments. Therefore, any impacts to users of these trails are expected to be temporary and minor.

The proposed Project would also cross one designated ATV trail, the Soo Line North ATV Trail in Cass County, Minnesota, at two different locations. A road bore crossing is proposed at MP 958.3, while the crossing at MP 964.9 would be open cut. Prior to construction, Enbridge would contact local clubs to inform them when construction would occur for each crossing of the Soo Line North Trail. In addition, the Applicant has committed to post signs around the construction area to inform local residents and trail users of construction activities. In general, construction of the proposed Project would not impede use of these trails. The primary activities that would impact to users of these ATV trails would be associated with the presence of construction equipment or trenching activities associated with installation of the pipeline. Enbridge has committed to assist riders in finding a safe path around these impediments. Therefore, any impacts at these two crossings are expected to be temporary and minor.

Hunting Areas

The entire construction and permanent right-of-way for the Alberta Clipper Project has been identified as possible hunting grounds. The construction right-of-way would be posted as a no-hunting zone during active construction. This would temporarily limit the area that may be used for hunting. This impact would be short term, and the land would be re-opened for hunting when construction is completed. Construction activities also may result in converting wooded areas to open areas; however, any adverse impacts to hunting would be minor.

Nemadji Golf Club

The initial route proposed by Enbridge would have crossed the Nemadji Golf Club in Superior, Wisconsin, with associated potential impacts to irrigation ponds. The City of Superior requested that Enbridge re-route the pipeline around the golf course. Enbridge attempted to comply with this request by routing around the golf course between MP 1096.3 and MP 1096.6. However, the COE and WDNR raised concerns about routing through wetlands in this area, as discussed in Section 3.4.2.25. Therefore, Enbridge has proposed a new route that avoids the wetlands and the irrigation ponds on the golf course.

The currently proposed route would cross the Nemadji Golf Club for a distance of about 0.5 mile. This crossing would impact the golf course, including restricting use of areas under construction, removing trees, and creating noise and dust during construction. Construction impacts would generally be minor and temporary, although the loss of the trees would be minor and long term.

4.9.3 Visual Resources

General visual impacts associated with the construction right-of-way, extra temporary workspaces, and operation include clearing and removal of existing vegetation, exposure of bare soils, earthwork and grading scars associated with heavy equipment tracks, trenching, rock formation alteration or removal, machinery and pipe storage, and landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

4.9.3.1 Agricultural Lands and Open Land

The majority of the proposed Alberta Clipper Project route would be located within or adjacent to existing rights-of-way for pipelines or roads, with little of the Project route consisting of new right-of-way. Visual impacts associated with pipeline construction in rangeland and agricultural areas along the route would be temporary and would result from the presence of construction equipment and post-construction visual scarring. In agricultural land, any visual scarring would remain within the right-of-way until new crops are planted. After replanting of the crops, any remaining visual impact from pipeline construction would be minor, but visual evidence of construction may last for a few years. The large majority of the open land that would be disturbed by pipeline construction would be along the existing right-of-way in a previously disturbed visual setting.

In many agricultural and rangeland areas, landowners plant trees or shrubs to act as windbreaks, shelterbelts, or living snow fences. These features reduce wind erosion, reduce evaporation from soils, increase crop yields, provide wildlife habitat and wind protection for livestock, and serve as visual screens. Enbridge has proposed mitigation to minimize impacts to these features. Pipeline construction and operation are expected to result in permanent but minor visual impacts to windbreaks. To the extent possible, Enbridge would minimize the width of the right-of-way when crossing windbreaks and shelterbelts, allowing sufficient room for the trench line and vehicle traffic.

4.9.3.2 Forested Land

Approximately 1,254.5 acres of forestland would be temporarily or permanently disturbed during construction of the Project. Trees within the construction right-of-way would be cleared. Enbridge has proposed construction mitigation and restoration measures to reduce potential impacts to forested land to minimal levels; however, trees would not be allowed to regenerate within the permanent right-of-way for the life of the Alberta Clipper Project. In the construction right-of-way, trees would be allowed to re-grow; however, trees likely would not regenerate within the construction right-of-way for many decades. The permanent right-of-way would generally be maintained clear of trees. Removal of trees along both

the permanent and construction rights-of-way would leave a highly visible deforestation line that would persist for the duration of pipeline operation. The visual impact related to the construction right-of-way would be long term but minor and localized, while the visual impact related to the permanent right-of-way would be permanent but minor and localized.

Enbridge conducted a visual assessment for the CNF and nearby landscapes. This assessment also included a mitigation plan to avoid and minimize visual impacts. Some of the mitigation measures listed for the CNF within the assessment are:

- Replacing large overstory species;
- Planting small trees and shrubs along edges to create a gradual vertical transition;
- Planting trees and/or shrubs in small groupings to screen a particular view; and
- Selectively removing existing plants to create a natural-looking transition from the right-of-way to the tree line.

While not all of these measures may be implemented along the CNF pipeline route, some would be implemented in areas where needed. Additional details on the visual assessment can be found in Appendix U.

4.9.3.3 Scenic Byways

As discussed previously, four scenic byways would be crossed by the pipeline. The Great River Road Scenic Byway would be crossed twice by the pipeline. At both locations, the road would be crossed along an existing right-of-way. A few trees may have to be removed along the edge of the right-of-way; however, it is expected that this would be a minor change in the viewscape. During construction, some activity may be seen from the roadway, but this would be temporary, occurring only during construction of this portion of the pipeline.

The pipeline would cross the Edge of the Wilderness Scenic Byway along an existing right-of-way. A few additional trees may be removed along the edge of the right-of-way within view of the road; however, these changes would be minor. During the construction period, activity may be visible from the roadway; but these impacts would be temporary.

The pipeline would cross the Veterans Evergreen Memorial Scenic Byway at State Highway 23. A thin row of trees lines the roadway, and trees within the construction right-of-way would be removed. Because most of the land in the immediate area of the pipeline crossing is open land, any tree removal would cause a minor change to the viewscape at this location. Construction activity may be viewable from the roadway; however, this impact is expected to be temporary and minor.

U.S. Highway 2 would be crossed by the pipeline seven times, and the pipeline would parallel the road for approximately 100 miles. At the seven locations where the pipeline actually crosses U.S. Highway 2, construction activities would be seen from the roadway. These impacts are expected to be minor and temporary. For the majority of the time that the pipeline parallels the road, the substantial buffer between the road and the potential pipeline would limit the amount of construction activities visible from the roadway. At a few points along the pipeline, there is little to no visual buffer between the roadway and the pipeline right-of-way. In these areas, construction activity would be viewable from the roadway, impacting the viewscape. From MP 955.6 to MP 988.9, the pipeline closely parallels U.S. Highway 2 through the CNF. Appendix U provides a detailed discussion of the visual impacts and mitigation measures through the CNF.

4.9.4 Connected Actions

The Superior Terminal Expansion Project is considered a connected action associated with the Alberta Clipper Project. The expansion would require construction of five breakout tanks and associated facilities and construction of a 4,600-foot facility line at the Enbridge Superior Terminal.

The land needed for construction of the new breakout tanks and a facility line would be located within the existing Superior Terminal totaling 20.5 acres. Land use impacts would include permanently impacting 11.3 acres of wetland and temporarily impacting 3.2 acres of wetland. The remainder of the impacts would be to developed land**.**

The five new tanks would be located adjacent to six existing tanks within the terminal. Because the new tanks would be located near existing structures in an industrial setting, any visual impacts are expected to be minor. Similarly, because the facility line is located on land that was previously developed within the terminal, any visual impacts would be minor.

4.9.5 References

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4.10 SOCIOECONOMICS

This section describes the socioeconomic conditions that currently exist within affected states, counties, and reservations. In addition, this section describes the socioeconomic conditions that may be impacted by construction and operation of the Alberta Clipper pipeline. The key topics discussed in this section are the local populations, housing, local economic activity, tax revenues, public services, transportation, and environmental justice.

4.10.1 Environmental Setting

4.10.1.1 Region of Influence

The proposed Alberta Clipper Project consists of an interstate crude oil pipeline that would extend approximately 326.9 miles across 15 counties in three states (North Dakota, Minnesota, and Wisconsin) in the United States, the LLR, and the FDL Reservation. The pipeline would be constructed and located near a number of communities, including the two reservations. In the 15 counties, it is anticipated that these communities and the reservations would incur most of the direct socioeconomic impacts of the Project, both positive and negative. The communities and reservations that would be crossed by, or within 1 mile of, the pipeline and their associated states and counties are listed in Table 4.10.1-1. The combination of these areas is considered the "region of influence" for this analysis.

Construction and operation of the proposed pipeline could result in several types of socioeconomic impacts. These could be temporary impacts due to construction or they could be more long-term or permanent impacts due to operation of the pipeline. Possible temporary impacts include changes to local population levels or demographics, increased demands for housing and public services, changes in transportation needs and traffic, and increased employment opportunities or needs for local goods. Long-term impacts due to operation would include employment and income benefits and increased tax revenue due to property taxes paid by Enbridge.

4.10.1.2 Population

A summary of the population characteristics within the region of influence at the county level and for each reservation is provided in Table 4.10.1-2. A list of the communities within 1 mile of the pipeline is provided in Table 4.10.1-1, including their estimated populations in 2007. The total population in the region of influence was 504,354 people in 2007, with an average population density of 17 people per square mile (based on density numbers from the U.S. Census in 2000). The low population density indicates that the region of influence is primarily rural and the pipeline would impact few high-density urban areas.

The least populated counties within the region of influence are Kittson and Red Lake Counties in Minnesota, with populations of 4,505 and 4,118 people, respectively in 2007. The most populated county in the region of influence is St. Louis County, Minnesota (196,694 people); however, the only community in the county that would be within 1 mile of the pipeline is Floodwood—with a population of 493 people. Only three communities within 1 mile of the pipeline have populations of over 10,000 people. Of these, the city of Superior, in Douglas County, Wisconsin has the highest population. With over 26,000 residents, Superior contains more than half of the population for Douglas County.

TABLE 4.10.1-1 Communities within Affected Counties along the Alberta Clipper Project Route[a]		
	Affected Community (2007 Population Estimate)	
Affected County	Crossed by Pipeline	Within 1.0 Mile of the Pipeline
North Dakota		
Pembina	--	--
Minnesota		
Kittson	--	Donaldson (36)
Marshall	--	Viking (88)
Pennington	--	Saint Hilaire (280)
Red Lake	Plummer (257); Oklee (363)	--
Polk	Trail (61)	Gully (104)
Clearwater	Leonard (28)	Gonvick (287); Clearbrook (535)
Beltrami	Wilton (196); Bemidji (13,419)	--
Hubbard	--	--
Cass	Cass Lake (811); Bena (102)	--
Aitkin	--	--
Itasca	Zemple (75); Cohasset (2,531); Warba (177)	Deer River (923); Grand Rapids (8,725); La Prairie (593)
St. Louis	Floodwood (493)	--
Carlton	--	Cloquet (11,352); Wrenshall (383)
Wisconsin		
Douglas	Superior (26,625); Town of Superior (2,058); Village of Superior (500)	Oliver (430)
Reservations	Fond du Lac (3,229) Leech Lake (8,669)	--

[a] Enbridge 2009.

The population within the region of influence increased by 5.5 percent from 1990 to 2006. However, from 2000 to 2007, the population only slightly increased (by 0.5 percent). The largest population growth from 2000 to 2006 was in Beltrami County, Minnesota, which increased by 10.0 percent. Since 2000, the population has decreased in seven of the 15 affected counties in the region of influence, with one county's population decreasing by 14.8 percent (Kittson County).

The proposed Project would also cross the LLR and FDL Reservation. The towns of Cass Lake and Bena (each with populations under 1,000 people) are both within the boundaries of the LLR, and both towns would be crossed by the pipeline. Additional information on the socioeconomic conditions of the LLR is provided in Appendix U. The proposed pipeline would cross within 1 mile of the town of Cloquet, which is located partially within the FDL Reservation. The total population of Cloquet is 11,352. The populations of the reservations increased approximately 16 percent from 1990 to 2000 (Table 4.10.1-2). The densities within the reservations indicate that these areas are mostly rural.

TABLE 4.10.1-2
Population Characteristics in Affected Counties and Reservations along the Alberta Clipper Project Route

State/County	Population 1990[a]	Population 2000[b]	Population 2007[b]	Percent Population Change 1990 – 2007	Percent Population Change 1990 – 2000	Percent Population Change 2000 – 2007	Population Density (people per square mile) 2000[b]
North Dakota	**638,800**	**642,200**	**639,715**	**0.1%**	**0.5%**	**-0.4%**	**9**
Pembina	9,238	8,585	7,531	-18.5%	-7.1%	-12.3%	8
Minnesota	**4,375,099**	**4,919,479**	**5,197,621**	**18.8%**	**12.4%**	**5.7%**	**62**
Kittson	5,767	5,285	4,505	-21.9%	-8.4%	-14.8%	5
Marshall	10,993	10,155	9,618	-12.5%	-7.6%	-5.3%	6
Pennington	13,306	13,584	13,756	3.4%	2.1%	1.3%	22
Red Lake	4,525	4,299	4,118	-9.0%	-5.0%	-4.2%	10
Polk	32,498	31,369	30,708	-5.5%	-3.5%	-2.1%	16
Clearwater	8,309	8,423	8,245	-0.8%	1.4%	-2.1%	8
Beltrami	34,384	39,650	43,609	26.8%	15.3%	10.0%	16
Hubbard	14,939	18,376	18,781	25.7%	23.0%	2.2%	20
Cass	21,791	27,150	28,723	31.8%	24.6%	5.8%	14
Itasca	40,863	43,992	44,542	9.0%	7.7%	1.3%	17
Aitkin	12,425	15,301	15,910	28.0%	23.1%	4.0%	8
St. Louis	198,213	200,528	196,694	-0.8%	1.2%	-1.9%	32
Carlton	29,259	31,671	33,893	15.8%	8.2%	7.0%	37
Wisconsin	**4,897,769**	**5,363,675**	**5,601,640**	**14.4%**	**9.5%**	**4.4%**	**99**
Douglas	41,758	43,287	43,721	4.7%	3.7%	1.0%	33
Reservations							
Fond du Lac	3,229	3,762	N/A	N/A	16.5%	N/A	24
Leech Lake	8,669	10,059	N/A	N/A	16.0%	N/A	11
Alberta Clipper Project Total[c]	**478,268**	**501,655**	**504,354**	5.5%	**4.9%**	0.5%	**17**

N/A = Not available.

a U.S. Census Bureau 2007.

b U.S. Census Bureau 2009a.

c Data for the reservations are not included in the totals because these units are captured in the respective county or counties.

4.10.1.3 Housing

An overview of the existing housing stock in the region of influence is provided in Table 4.10.1-3. Available housing in the region is based on the number of available units, any recent population or economic growth, and demand of the available housing from other sources. Based on 2007 estimates, 276,247 housing units are located in the region of influence; with St. Louis County, Minnesota having the highest number of units (99,907). Because many of these units are single-family houses, they would not generally be expected to be available for construction workers of the Alberta Clipper Project.

Facilities that would likely be available to Alberta Clipper construction workers would be housing units such as rental properties and short-term accommodations like hotels and motels. In 2000, the total number of rental properties located in the region of influence was 49,577 units. The rental vacancy rates varied among counties, ranging from 4.4 to 16.2 percent. Based on these numbers, approximately 3,196 rental units were available in the region of influence in 2000. At the county level, the smallest number of available units (32) was located in Clearwater County, Minnesota. The highest number was located in St. Louis County, Minnesota, with over 1,000 available units. Over the entire region of influence, seven of the 15 affected counties and both of the reservations had available rental units numbering below 100. In two of these counties (Red Lake and Clearwater), less than 50 rental units were available in 2000.

An alternative to renting houses is short-term temporary housing such as hotel/motels, RV and mobile home parks, and campgrounds. Recreational and seasonal housing also may be available in some areas. There are approximately 543 hotels/motels and 276 campgrounds (including RV parks) within the region of influence (Table 4.10.1-4). The availability of short-term housing depends on such factors as the time of year, location, and special local events that would increase demand.

4.10.1.4 Economic Base

The economic base of an area reflects its major industries. Educational, health, and social services; retail trade; and manufacturing are the top employment industries in the counties that would be affected by the proposed Project.

Employment and income patterns provide insight into local economic conditions, including the strength of the local economy and well-being of its residents. Summary statistics covering these economic parameters are shown in Table 4.10.1-5. Income levels vary throughout the region of influence. The per capita income ranged from approximately $24,266 to $34,248, and the median household income ranged from $34,503 to $49,616. In all of the affected counties, both the household income and the per capita income were below the average for their respective states.

The median household income and per capita income for the LLR and FDL Reservation are lower than those for the State of Minnesota. When compared to the county average across the proposed route, the personal household income for the LLR is lower and the FDL Reservation is slightly higher.

The civilian labor force in the region of influence was 263,519 individuals, and county unemployment in the region ranged from 4.5 to 10.4 percent. The unemployment rate for the FDL Reservation was 8.8 percent while the LLR had an unemployment rate of 10.7 percent. Based on the labor force and the unemployment rates for each county, more than 15,795 individuals are estimated to be unemployed in the region of influence.

TABLE 4.10.1-3
Housing Stock in Affected Counties and Reservations along the Alberta Clipper Project Route

State/County	Total Housing Units (2007)[a]	Building Permits (2007)[a]	Total Rental Units (2000)[b]	Rental Vacancy Rate (2000)[b]	Estimated Vacant Rental Units (2000)[b]
North Dakota	**310,548**	**3,360**	**93,207**	**8.2%**	**7,643**
Pembina	4,095	4	902	15.3%	138
Minnesota	**2,304,467**	**17,930**	**253,062**	**8.1%**	**20,498**
Kittson	2,744	6	444	16.2%	72
Marshall	4,933	4	752	10.5%	79
Pennington	6,268	16	1,589	10.7%	170
Red Lake	1,936	6	382	10.2%	39
Polk	14,635	109	3,451	9.1%	314
Clearwater	4,275	8	640	5.0%	32
Beltrami	18,491	179	3,795	4.4%	167
Hubbard	13,021	76	1,352	7.1%	96
Cass	25,539	431	1,660	5.0%	83
Aitkin	16,263	254	1,077	9.1%	98
Itasca	27,104	212	3,156	4.5%	142
St. Louis	99,907	625	22,400	6.0%	1,344
Carlton	15,514	191	2,244	4.5%	101
Wisconsin	**2,560,099**	**21,836**	**538,917**	**7.2%**	**38,802**
Douglas	21,522	185	5,732	5.6%	321
Reservations[d]					
Fond du Lac	1,513 [b, c]	Not available	300	0.7%	2
Leech Lake	6,828[b,c]	Not available	746	5.6%	41
Total[e]	**276,247**	**2,306**	**49,577**		**3,196**
Average				**6.4%**	

[a] U.S. Census Bureau 2007.

[b] U.S. Census Bureau 2009a.

[c] Housing unit data for the reservations are based on information from the 2000 census. No 2006 estimates were available for the reservations.

[d] Housing unit data for the reservations are not included in the totals since these units are captured in the respective county or counties.

[e] Data for the reservations are not included in the totals since these units are captured in the respective county or counties.

TABLE 4.10.1-4
Number of Hotel/Motels and Campgrounds by County along the Alberta Clipper Project Route

State/County	Hotel/Motels	Campgrounds
North Dakota[a]		
Pembina	6	9
Minnesota[b]		
Kittson	4	3
Marshall	2	6
Pennington	7	1
Red Lake	2	1
Polk	8	6
Clearwater	3	3
Beltrami	42	23
Hubbard	69	29
Cass	122	57
Aitkin	8	19
Itasca	62	36
St. Louis	175	53
Carlton	11	10
Wisconsin[c]		
Douglas	22	20
Total [d]	**543**	**276**

[a] Minnesota Information: Minnesota Tourism Office 2008.

[b] Wisconsin Information: Wisconsin Tourism Office 2008.

[c] North Dakota Information: North Dakota Tourism 2008.

[d] Hotels/motels and campgrounds within the boundaries of the reservations are captured in the respective county or counties.

TABLE 4.10.1-5 Existing Income and Employment Conditions in Affected Counties States, and Reservations along the Alberta Clipper Project Route				
State/County	**Per Capita Personal Income for 2006 (2007$)**[a]	**Median Household Income for 2007 (2007$)**[b]	**Labor Force (2007)**[c]	**Unemployment Rate (2007)**[c]
North Dakota	**$33,746**	**$43,936**	**364,900**	**3.2%**
Pembina	$33,132	$42,646	4,009	5.8%
Minnesota	**$40,025**	**$55,664**	2,930,568	**4.6%**
Kittson	$29,662	$39,591	2,486	5.8%
Marshall	$29,300	$45,145	5,176	8.2%
Pennington	$34,248	$41,785	8,637	6.9%
Red Lake	$24,970	$40,008	2,240	8.4%
Polk	$29,125	$43,188	17,226	4.5%
Clearwater	$24,266	$34,503	3,867	10.4%
Beltrami	$27,031	$41,039	21,136	6.1%
Hubbard	$28,240	$42,231	9,235	6.4%
Cass	$30,392	$38,707	14,515	7.1%
Aitkin	$25,931	$38,610	7,769	6.9%
Itasca	$27,794	$43,622	22,411	7.3%
St. Louis	$33,994	$42,698	104,083	5.6%
Carlton	$27,337	$49,616	17,500	5.7%
Wisconsin	**$35,437**	**$50,567**	3,089,332	**4.9%**
Douglas	$27,188	$38,787	23,229	5.0%
Reservations				
Fond du Lac[d]	$19,283	$47,356	1,729	8.8%
Leech Lake[d]	$16,248	$34,890	4,341	10.7%
Total[e]			**263,519**	
Average	**$28,841**	**$41,478**		**6.7%**

a U.S. Bureau of Economic Analysis 2008.
b U.S. Census Bureau 2009b.
c U.S. Department of Labor 2007.
d U.S. Census Bureau 2009a. All data for the reservations in this table represent values for the year 2000.
e Data for the reservations are not included in the totals since these units are captured in the respective county or counties.

4.10.1.5 Tax Revenue

Tax revenues would be generated for the affected federal, state, and local governments from construction and operation of the proposed Alberta Clipper Project. At the state and local level, the primary source of

tax revenue would be property taxes paid by Enbridge. These taxes would be based on the assessed value of the property and the varying state and local tax rates.

Table 4.10.1-6 summarizes the total government revenue and effective property tax rates for all of the affected counties in the region of influence. Property tax rates vary by county. The lowest rate is 1.7 percent in Douglas County and the highest rate is 3.7 percent in Itasca County. All non-trust fee lands within the reservations would be subject to local and county property taxes, which would be part of the overall county revenue (Minnesota House of Representatives 1999). In addition, Enbridge has been working directly with LLBO and FDL to determine any taxes or other monetary compensation for crossing reservation lands.

TABLE 4.10.1-6
Property Tax Rates for Affected Counties and States along the Alberta Clipper Project Route

State/County	Portion of Pipeline Through County (%)	Government Revenue (2007$)[a]	County Property Tax Revenue (2007$)[a]	Effective Property Tax Rate (%)[b]	Annual Property Tax Revenue from Project (2011$)[b,e]	Capital Cost of Project (2008$)
North Dakota						
Pembina	8.56%	$4,069,000	$2,594,000[c]	3.337%	$900,000	$87,900,000
Minnesota						
Kittson	4.71%	$10,009,105	$2,211,822	2.516%	$1,000,000	$48,300,000
Marshall	10.74%	$15,075,402	$3,642,061	3.001%	$2,600,000	$127,000,000
Pennington	6.01%	$17,226,461	$5,053,772	3.178%	$1,300,000	$61,700,000
Red Lake	4.77%	$4,980,518	$1,696,212	2.841%	$1,000,000	$48,900,000
Polk	4.29%	$56,678,600	$1,482,698	3.115%	$900,000	$44,000,000
Clearwater	6.40%	$16,702,649	$3,961,067	2.707%	$2,000,000	$99,200,000
Beltrami	7.01%	$56,418,209	$14,489,376	2.618%	$1,500,000	$71,900,000
Hubbard	2.40%	$27,753,632	$9,505,990	2.778%	$500,000	$24,700,000
Cass	10.46%	$45,628,378	$18,035,214	2.761%	$2,200,000	$107,300,000
Itasca	15.39%	$82,833,213	$25,237,192	3.676%	$3,600,000	$174,700,000
Aitkin	0.35%	$23,820,882	$10,249,096	3.468%	$100,000	$3,600,000
St. Louis	7.55%	$243,163,318	$97,288,703	3.250%	$1,600,000	$77,500,000
Carlton	7.33%	$37,574,170	$16,859,668	3.135%	$1,500,000	$75,200,000
Wisconsin						
Douglas	4.02%	$15,080,367	$3,173,657	1.730%	$1,300,000[d]	$118,700,000

[a] North Dakota: U.S. Census Bureau 2005. (Adjusted from 2002$ to 2007$ based on a CPI of 1.15.)
Minnesota: MN OSA 2008.
Wisconsin: Douglas County 2007.

[b] Enbridge 2009.

[c] Tax revenues for Pembina County represent total tax revenue, not just property tax revenue.

[d] Property taxes in Wisconsin are paid into the State General Fund.

[e] Annual property tax revenue for the Project is in 2011 dollars because this will be the first year that the Project is in operation.

The proposed Project may generate other revenues, such as sales and use taxes from goods and materials purchased by construction crews and income taxes levied on labor earnings. The magnitude of revenues in each county and within the reservations would vary because sales and income tax rates vary across counties. Fees imposed by federal agencies for use of public lands for activities such as pipelines and transmission rights-of-way also would generate revenue.

4.10.1.6 Public Services

Public services in the region of influence that could to be impacted by, or of benefit to, the proposed Project include police and fire protection and medical facilities. It is unlikely that many construction workers would relocate with school-aged children; therefore, impacts on educational facilities would be minor. Table 4.10.1-7 provides information on the number of public service offices in the region of influence.

The law enforcement service providers throughout the region of influence include state, county, and local police departments. In 14 of the 15 impacted counties, there are fewer than 10 law enforcement agencies/offices within the county. The exception is St. Louis County in Minnesota, which has 21 law enforcement agencies and offices. Each reservation also has its own police department.

Numerous fire departments and fire protection services are located in the region of influence. These organizations are composed of volunteer or paid firefighters. In most of the counties, the number of fire departments present is similar to the number of police agencies present. Both reservations use fire protection services from towns close to the respective reservations.

A list of the nearest medical facilities is provided in Table 4.10.1-7. These facilities are located within 50 miles of the proposed Project route. In every county and both reservations along the pipeline route, at least one nearby medical facility is within the county/reservation or an adjacent county. These facilities would provide medical care and emergency services to Alberta Clipper construction workers, as needed.

4.10.1.7 Transportation and Traffic

Highways and Rural Roads

The proposed Alberta Clipper Project would require numerous crossings of federal, state, and local roadways. The proposed pipeline route would cross federal or state roads 31 times, including the following interstates and U.S. highways:

- Interstate (I) 29 and US-81 in North Dakota; and
- I-35, US-75, US-59, U.S. Highway 210, U.S. Highway 2, and US-169 in Minnesota.

Throughout the counties of Beltrami, Cass, Hubbard, and Itasca, the pipeline route closely follows U.S. Highway 2. Overall, the pipeline would cross U.S. Highway 2 seven times in Beltrami, Itasca, and St. Louis Counties, Minnesota. Along with the high number of crossings of this road, the proposed pipeline would parallel U.S. Highway 2 for over 100 miles.

In addition to the 31 major federal and state highway crossings, the proposed pipeline route would cross 373 local and rural roads.

TABLE 4.10.1-7
Existing Public Service Facilities along the Alberta Clipper Project Route

State/County	Police / Sheriff Departments[a]	Fire Departments[a]	Nearest Medical Facilities[b]
North Dakota			
Pembina	5	8	Pembina County Memorial Hospital (Cavalier)
Minnesota			
Kittson	3	5	Kittson Memorial Hospital (Hallock)
Marshall	3	7	North Valley Health Center (Warren)
Pennington	3	3	Northwest Medical Center (Thief River Falls)
Red Lake	2	1	First Care Medical Services (Oklee)
Polk	8	10	First Care Medical Services (Fosston)
Clearwater	5	2	Clearwater County Memorial (Bagley)
Beltrami	4	4	North Country Health Services (Bemidji)
Hubbard	5	5	St. Joseph's Area Health Center (Park Rapids)
Cass	6	6	Cass Lake (PHS Indian) Hospital (Cass Lake)
Itasca	9	11	Deer River Healthcare (Deer River); Grand Itasca Hospital (Grand Rapids)
Aitkin	3	3	Riverwood Healthcare Center (Aitkin)
St. Louis	21	58	Miller-Dwan Medical Center (Duluth); Saint Luke's Hospital (Duluth)
Carlton	6	15	Community Memorial (Coquet)
Wisconsin			
Douglas	6	16	St. Mary's Hospital of Superior (Superior)
Reservations			
Fond du Lac[c]	1	0	Min No Aya Win Human Services Center (Cloquet)[d]
Leech Lake[e]	1	0	Cass Lake Hospital (Cass Lake)

[a] Capitol Impact Government Gateway 2008.
[b] American Hospital Directory 2008.
[c] Houle 2008.
[d] FDL Reservation 2008.
[e] Minnesota Indian Affairs 2008.

Railroads

The proposed pipeline route includes 21 railroad crossings across 11 counties. Thirteen of these crossings would be of railroads operated by the Burlington Northern Sante Fe Railway in Minnesota and Wisconsin. The proposed pipeline would cross the Canadian Pacific Railway three separate times, twice in Minnesota and once in Wisconsin.

The other five railroad crossings are operated by five separate railway companies: Northern Plains Railroad; Minnesota Northern Railroad, Inc.; Duluth, Mesabi and Iron Range Railway; Wisconsin Central Railway; and Burlington Northern Railway. Additional information on potential historic aspects of these railroads is provided in Section 4.11.

4.10.2 Potential Impacts and Mitigation

The potential socioeconomic impacts of constructing and operating the Alberta Clipper Project would vary throughout the region in both duration and magnitude. The duration may be temporary, short-term, long term, or permanent. The magnitude of these impacts is based on the following factors: the level of disruption of social or economic activities; impact on the housing stock; changes in property value; changes in revenues, including taxes; and any burden on public service providers. The analysis of potential Project-related impacts characterizes them as positive or negative and their potential magnitude. Section 4.10.2.1 addresses the anticipated socioeconomic effects during the construction period, and Section 4.10.2.2 addresses operations-related impacts.

4.10.2.1 Construction Impacts

Construction of the Alberta Clipper Project would occur over multiple spreads during two separate construction periods: one in summer/fall, and one in winter (Table 4.10.2-1). During the summer/fall construction period, workers would be working along four construction spreads. During the winter construction period, workers would be working along two construction spreads. Enbridge has proposed that construction begin in summer 2009 and take between 9 and 11 months, with an in-service date early in 2010. The actual construction schedule is dependent on if and when the necessary federal, state, tribal, and local approvals are provided.

TABLE 4.10.2-1
Locations and Lengths of Alberta Clipper Construction Spreads

	Milepost[a]		
Spread No.	**Start**	**End**	**Approximate Total Miles**
Summer/fall	773.7	848.0 (Viking Pump Station)	75
Summer/fall	848.0	909.0 (Clearbrook Pump Station)	61
Summer/fall	909.0	996.0 (Deer River Pump Station)	87
Summer/fall	996.0	1098.1 (Superior Terminal)[b]	79
Total miles summer/fall construction			*302*
Winter	996.0	1003.0 (Prairie River)	7
Winter	1028.0	1045.6 (Floodwood)	18
Total miles winter construction			*25*
Total miles of Alberta Clipper pipeline			**327**[c]

[a] Mileposts are used for reference and do not reflect actual distances. The proposed pipeline route starts at MP 773.7 and ends at MP 1098.1, a difference of 324.4 miles; however, the actual length of pipeline would be 326.9 miles because of deviations from the existing milepost-reference pipeline.

[b] Does not include winter construction from MP 1028 to MP 1045.6 (18 miles).

[c] Mileages rounded to the nearest whole number; actual total mileage is 326.9.

Population

The total construction workforce over the entire construction schedule would be approximately 1,200 workers, with many of the summer workers moving into the winter construction areas. These workers would be distributed across the pipeline route, with approximately 300 workers per construction spread. In locations where the Alberta Clipper and Diluent Project construction spreads are adjacent, up to 600 workers would be present. Population impacts in the region of influence would depend on the number of local and non-local workers that are employed. Enbridge would attempt to hire local workers whenever the local workforce possesses the skills needed for construction. Non-local workers would reside in the Project vicinity temporarily, and it is not expected that these workers would be accompanied by family members. Based on the construction workforce for other Enbridge projects in the area, it is anticipated that about 40 percent of the workforce would be non-local workers. This translates to approximately 480 non-local workers during summer and 120 non-local workers during winter. These workers would be spread throughout the region along different construction spreads. Consequently, the short-term increase in population within the region of influence due to non-local workers is anticipated to be minimal.

Housing

Non-local individuals working on pipeline construction would need to reside in the area temporarily. Workers are not expected to be accompanied by their families and are likely to use temporary housing, such as hotels/motels, RV parks, and campgrounds. In areas that are more populated, workers are likely to stay in hotels and motels, while more remote construction areas may require workers to stay in RV parks or campgrounds.

As noted above, approximately 1,200 workers during summer and 300 workers during winter could require housing during construction. Because approximately 60 percent of the workforce is expected to be local workers, only about 480 workers in summer and 120 workers in winter would need housing. The availability of short-term housing varies along the pipeline route; however, with approximately 543 motel/hotels and 276 campgrounds in the region of influence, the available housing appears to be sufficient to accommodate any non-local construction workers for the duration of the pipeline construction.

Portions of the pipeline would be located in remote areas with a limited amount of short-term housing. In these areas, workers may need to depend on RV parks and campsites, or may need to drive longer distances to find accommodations. Across the proposed route accommodations could be as close as 0.25 mile and as far as 100 miles from the construction areas. The portion of the workforce working on sections of the pipeline that are proximal to more urban areas are likely to find sufficient housing in hotels/motels that are a short distance from the worksite. Overall, the temporary presence of non-local construction workers is not expected to cause a significant impact on the available housing in the region of influence.

Local Economic Activity and Tax Revenue

The proposed Alberta Clipper Project could generate direct and indirect economic benefits and an increase in tax revenue for the local and regional economies along the pipeline route. These benefits may be derived from employing local laborers and any related benefits such as wage earnings and worker spending, as well as spending on construction goods and services.

Construction of the Alberta Clipper pipeline would require a workforce of approximately 1,200 individuals during summer and 300 individuals during winter. As discussed above, it is estimated

that 60 percent of the workforce would be local workers. The income produced from these jobs would be beneficial to the workers and to the local economies, including those of the reservations. The estimated total construction payroll for both local and non-local workers for the entire Alberta Clipper Project would be about $276 million. A short-term increase in federal, state, and local income tax revenue would be generated from the construction payroll.

In addition to payroll spending, a substantial portion of Project expenses would involve goods and services, both inside and outside of the region of influence. The expenditures could include fuel, supplies, hardware, parts, and equipment. Enbridge estimates that approximately $110 million of the construction costs would be spent locally, with approximately $40 million spent on fuel, $60 million spent on food and lodging for workers, and $10 million on miscellaneous items. Short-term tax revenues would be generated through taxes on the local goods and services purchased during the construction period.

Overall, construction of the Alberta Clipper Project would result in a positive impact to the local economy. Minor economic benefits on more of a regional or national level would result due to the hiring of a non-local labor force and importing materials and services. The monetary benefits of the Alberta Clipper Project to the affected state and local governments would include short-term tax revenues from construction. Most of the construction-related economic impacts would occur over the 9 to 11 month construction period and would be temporary.

Agriculture

Construction of the Alberta Clipper Project has the potential to negatively impact agricultural lands and those who depend on that land. "Agricultural land" is described as cropland, grassland, and forestland and could include activities such as crop harvesting, livestock grazing, dairy production, and timber production.

The dominant land use within the region of influence is agricultural, making up about 42 percent of the land crossed by the proposed pipeline. Approximately 2,528.8 acres of agricultural land would be temporarily impacted; production of crops would be prevented during the construction period. This would result in losses to agricultural production and the economic activity associated with production. Enbridge would pay market rate for crops that were not able to be planted or those that were planted and destroyed during construction. In general, Enbridge proposes to compensate landowners 60 percent of the first year following restoration and 40 percent the second year following restoration to mitigate potential crop losses from pipeline construction activities. Most impacts related to use of agricultural lands would be short term. For a more detailed description of mitigation and compensation measures for agricultural lands, refer to Section 4.9.3.1.

Public Services

During construction of the Alberta Clipper pipeline, emergency or routine events could require assistance from local public service offices. Such occurrences could result in a temporary increase in the demand for emergency response, police, fire, and medical personnel. Table 4.10.1-7 lists the number of public service offices located within the region of influence.

The presence of non-local workers within the local area also could increase the demand for public services. The impact on these services would vary by community, based on the number of non-local construction workers present, their length of stay, and the size of the community. It is not anticipated that workers would be accompanied by their families due to the short duration of the work. Therefore, potential impacts to public services would be short-term and minor.

Transportation and Traffic

Construction activities could result in short-term impacts to transportation infrastructures and traffic. The traffic volume along roads close to the pipeline could increase due to the movement of construction equipment, material, and crewmembers. Temporary road closures also may be required; however, Enbridge would try to avoid road closures during peak-traffic periods. Impacts to local traffic levels during construction would be temporary and minor. Construction across any paved roads, highways, or roadways would be subject to the requirements of the necessary state and local permits. Enbridge would obtain these permits prior to the start of construction.

To minimize impacts to traffic, all paved roads and all railroads would be crossed by boring underneath the road. Using this construction technique would prevent the need for road closures and allow traffic to operate normally. One major highway that may be impacted by construction is U.S. Highway 2. The proposed pipeline would parallel U.S. Highway 2 for about 100 miles and cross it seven times. Boring techniques would minimize direct impacts to the road; however, construction on the portions of the pipeline that parallel the road could result in increased traffic. These impacts would be temporary, occurring only during construction.

The open-cut construction method typically would be used for unpaved roads. This construction method would require temporary closure and detours. According to the Applicant, if no reasonable detour is available, at least one traffic lane would be maintained, except for brief periods during installation of the pipe. Disturbances at each open-cut road crossing typically would be limited to 1 day and are not expected to significantly affect local traffic patterns. All necessary safety measures such as detours, warnings, traffic control, and safety signs would be implemented as prescribed by federal, state, and local (county) departments of transportation. Enbridge would attempt to avoid road closures during peak-traffic periods.

Access to most of the construction right-of-way would be obtained using pre-existing public and private roads. Any damage to roads due to construction-related activities would be repaired as needed by Enbridge.

Property Damages and Values

Enbridge would acquire permanent right-of-way easements along the pipeline route. While land use types vary along the route of the pipeline, as described in Section 4.9, the predominant land use type is agricultural (42.2 percent). In order to minimize the impacts to agricultural lands during construction, Enbridge would implement the measures described in its AMP and state-specific EMPs (Appendices C and D, respectively). Among the measures listed in these plans are tile damage and repair provisions, pipeline burial depth to prevent disruption of drainage ditches, measures to minimize soil compaction, and efforts to prevent impacts to irrigation systems.

If any crops were destroyed or were not able to be planted due to construction, Enbridge would pay market rate for those crops. All damages to tiles, fences, and irrigation systems would be restored or repaired. Enbridge would be responsible for returning all lands to pre-construction levels of productivity. Crop productivity is expected to return to normal the year following construction. However, Enbridge would compensate landowners 60 percent for the first year following restoration and 40 percent the second year following restoration to mitigate potential crop loss. After this time, pre-construction productivity levels are expected to resume.

Based on comments received on the DEIS and associated with landowner experience with other Enbridge projects, the Applicant has constructed a Complaint Handling Procedures Plan, see Appendix X. As

discussed in Section 4.9, this plan was designed to provide landowners with the necessary contact information in the event that the details of the individual easement negotiations or details of the mitigation plans referenced throughout this document are not being upheld.

It is unlikely that the property value of land in the construction or permanent right-of-way would be adversely impacted by the presence of the pipeline. A study conducted by Astine (2003) showed that decreases in property taxes typically are associated with facilities that produce emissions that are easily noticeable by the surrounding community, such as odors, smoke or vapors, or noise. The proposed Project may result in some noise impacts during construction; however, these impacts are expected to be temporary and would occur only during active construction (see Section 4.12.2). The proposed pipeline itself would not emit any odors, vapors, or noise and therefore is not expected to decrease property values. Alternatively, the associated pumping stations may generate odors, vapors, or noise, as discussed in Sections 4.12. Because these facilities would be located in proximity to the existing industrial facilities (e.g., pump stations, Clearbrook Terminal), no measurable impact to property values is expected.

Environmental Justice

The analysis of environmental justice effects is presented in Section 4.10.2.2

Conclusion

Overall, impacts due to construction of the proposed Project would be minor. The increases in the population, the need for temporary housing, and increases in roadway traffic within the region of influence would be minor. There would be economic benefits for the reservations, counties, states, and local governments as well as local businesses due to spending by the construction workforce. The Diluent Project, which would be constructed concurrently with the Alberta Clipper Project within Spreads 3 and 4, also would require a total workforce of 240 during the summer and 120 during the winter. While this project is not part of the proposed Project, as discussed in Section 2.0, we recognize the potential cumulative impacts associated with the concurrent construction of the two lines. However, the incremental effect of the construction of the Diluent Project would cause a negligible increase in the expected impacts presented above for the Alberta Clipped Project.

4.10.2.2 Operations Impacts

Population

Operation of the proposed pipeline would require up to six full-time new employees. These employees would be based at existing Enbridge facilities in Clearbrook, Thief River Falls, Bemidji, and/or Superior. It is not expected that these individuals would cause a serious impact on the demographic characteristics in those areas.

Housing

Housing demands for the six full-time employees and their families are expected to be minor. Because of the small influx of individuals, it is anticipated that the local housing resources could accommodate the demand.

Local Economic Activity and Tax Revenue

During operation, the proposed pipeline would benefit the local economy by generating a demand for electricity, goods, and services. The salary of the permanent workers and their subsequent needs for housing and goods in the area also would benefit the local economy to a minor degree.

Once constructed, the pipeline would generate property tax revenues for the states and counties it traversed for the life of the Project. Estimates of property tax revenue from the pipeline by county and state are summarized in Table 4.10.2-2. These estimates are based on the value and length of pipe in the ground. The Project would generate annual property tax revenues of approximately $1.0 million in North Dakota, $19.8 million in Minnesota, and $1.3 million in Wisconsin. The pipeline would generate a total of $22.0 million in revenue for the region of influence annually. This represents 9.8 percent of the total annual property taxes within the affected counties. Within the respective counties, the benefit varies from a minor increase to a substantial increase in revenue. In all counties, however, this benefit would be permanent. Enbridge has worked directly with the LLR and FDL Reservation on appropriate compensation measures.

Agriculture

Upon completion of the pipeline construction activities, all agricultural land outside the permanent right-of-way and most of the agricultural land within the permanent right-of-way would return to its original use within the permanent right-of-way. The exceptions would be practices such as forest production or orchard operations within the permanent right-of-way. These activities, along with any re-growth of trees, would not be allowed along the permanent right-of-way. There would be no permanent impact to agricultural lands due to modifications at the existing pump stations.

In North Dakota, five CRP parcels would result in temporary impacts to 16.3 acres, of which 2.9 acres would be within the permanent right-of-way. In North Dakota, two parcels of WRP lands would be crossed, resulting in 8.5 acres impacted during construction and 1.8 acres permanently impacted. Two parcels of EWP Program also would be crossed in North Dakota, resulting in 8.5 acres impacted during construction and 1.5 acres permanently impacted. In Minnesota, 63 parcels of CRP lands would be crossed. Approximately 257.7 acres of that land would be impacted during construction, of which 46.6 acres would be maintained in the permanent right-of-way during operation of the pipeline. No CRP or WRP lands would be crossed in Wisconsin, resulting in no impacts.

Mitigation recommendations for specialty lands are described in Section 4.9. Impacts to these lands are expected to be minor.

Public Services

An increase in demand for public services due to the influx of the six full-time employees and their families is expected to be permanent, but minor. Any increased need for these services would be offset by increases in revenue from property tax payments.

TABLE 4.10.2-2 Property Tax Revenues Generated by the Alberta Clipper Project			
State/County	**Current Total Ad Valorem Property Taxes (2007$)[a]**	**Annual Property Tax Revenue (Project) ($)[b]**	**Percent of Existing Revenue (%)**
North Dakota			
Pembina	$2,594,000[c]	$900,000	34.7%
North Dakota Subtotal	*$2,594,000*	*$1,000,000*	*33.5%*
Minnesota			
Kittson	$2,211,822	$1,000,000	45.2%
Marshall	$3,642,061	$2,600,000	71.4%
Pennington	$5,053,772	$1,300,000	25.7%
Red Lake	$1,696,212	$1,000,000	59.0%
Polk	$1,482,698	$900,000	60.7%
Clearwater	$3,961,067	$2,000,000	50.5%
Beltrami	$14,489,376	$1,500,000	10.4%
Hubbard	$9,505,990	$500,000	5.3%
Cass	$18,035,214	$2,200,000	12.2%
Itasca	$25,237,192	$3,600,000	14.3%
Aitkin	$10,249,096	$100,000	1.0%
St. Louis	$97,288,703	$1,600,000	1.6%
Carlton	$16,859,668	$1,500,000	8.9%
Minnesota Subtotal	*$209,712,871*	*$19,800,000*	*9.4%*
Wisconsin			
Douglas	$3,173,657	1,300,000[d]	41.0%
Wisconsin Subtotal	*$3,173,657*	*$1,300,000*	*41.0%*

[a] North Dakota: U.S. Census Bureau 2005. (Adjusted from 2002$ to 2007$ based on a CPI of 1.15.)
Minnesota: MN OSA 2008.
Wisconsin: Douglas County 2007.

[b] Enbridge 2009.

[c] Tax revenues for Pembina County represent total tax revenue, not just property tax revenue.

[d] Property taxes in Wisconsin are paid into the State General Fund.

Transportation and Traffic

The proposed pipeline would be located underground, and pipeline operation would not affect the local transportation systems. A minor increase in vehicle trips could be associated with the six new permanent staff commuting to work. No measurable increase in the number of cars in use, fuel consumption, or vehicle noise would be associated with these employees; thus, carbon footprint impacts would not be expected relative to current conditions. All new aboveground facilities would be located at existing stations or within the existing right-of-way; they are not anticipated to impact transportation or traffic.

Property Damages and Values

Any adverse impacts on property values due to the pipeline would depend on a variety of factors. These include the size of the property, its current value, use of the land, and the value of other nearby properties.

The majority of the land affected by the pipeline is agricultural. After construction is complete, this land would be allowed to revert to pre-construction uses. As noted, Enbridge would compensate landowners for crop loss that occurred during construction; however, Enbridge anticipates that production of these fields would return to pre-construction levels. If a landowner or farmer demonstrates continued loss of productivity because of the Project, Enbridge would work with the landowner to restore the land and compensate the individual accordingly.

Potential impacts to lands enrolled in the MFL (Wisconsin) would be negotiated as part of the third-party easement negotiations between Enbridge and individual land owners. See Section 4.5 for additional details on MFL lands.

Environmental Justice

The demographic characteristics in the region of influence are important when determining impacts, including the environmental justice impacts, of any project. To determine the environmental justice impacts in the region of influence, factors such as the racial composition and economic status of the affected areas are taken into account. An analysis of the potential environmental justice effects is included in this section pursuant to EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994). Related guidance—Environmental Justice: Guidance under the National Environmental Policy Act (1997)—also had been prepared by the CEQ. The key socioeconomic data are summarized in Table 4.10.2-3.

Minority Populations

In accordance with the CEQ guidance, minority populations should be identified where either (a) the minority population in the affected area exceeds 50 percent; or (b) the minority population of the affected area is meaningfully greater than the minority population in the surrounding area. For this analysis, the "affected area" is defined as the communities crossed by or within 1 mile of the pipeline, the "general population" refers to the state within which the community is located, and "meaningfully greater" means at least 1.5 times the corresponding measure for the general population.

The 2000 Census data show that one minority group, American Indian/Alaskan Native, in the region of influence exceeded 50 percent of the population in two communities. Both of these communities, Cass Lake and Bena, Minnesota, are located within the LLR. In addition, nine of the remaining communities had a meaningfully greater percentage of American Indian/Alaskan Native population compared to their associated state. The percentage of American Indian/Alaskan Native population in seven of these communities is 100 percent higher than for the respective states (Gonvick, Bemidji, Zemple, Deer River, Cloquet, and Wrenshall in Minnesota and Superior in Wisconsin) and 50 percent higher than the state in two communities (Grand Rapids, Minnesota and Oliver, Wisconsin).

TABLE 4.10.2-3
Environmental Justice Statistics in Affected Communities along the Alberta Clipper Project Route

State/County	White (Not Hispanic) (%)	Black or African American (%)	Native American or Alaskan Native (%)	Asian (%)	Native Hawaiian and Other Pacific Islander (%)	Other (%)	Two or More Races (%)	Hispanic or Latino Origin (%)	Persons with Income below Poverty Level (%)
North Dakota	**92.4**	**0.6**	**4.9**	**0.6**	**0.0**	**0.4**	**1.2**	**1.2**	**11.9**
Minnesota	**89.4**	**3.5**	**1.1**	**2.9**	**0.0**	**1.3**	**1.7**	**2.9**	**7.9**
Donaldson	97.6	0.0	0.0	0.0	0.0	0.0	2.4	0.0	7.7
Viking	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3
Saint Hilaire	98.5	0.0	0.0	0.0	0.0	0.0	1.5	0.0	14.1
Plummer	98.9	0.7	0.4	0.0	0.0	0.0	0.0	0.0	8.5
Oklee	98.7	0.0	1.0	0.0	0.0	0.0	0.3	0.0	14.7
Trail	95.2	0.0	1.6	0.0	0.0	1.6	1.6	1.6	22.2
Gully	99.1	0.0	0.0	0.0	0.0	0.0	0.9	0.0	16.8
Leonard	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7
Gonvick	91.5	0.0	4.4	0.0	0.0	2.4	1.7	3.4	12.0
Clearbrook	96.2	0.0	1.5	0.4	0.0	0.2	1.8	0.7	10.5
Wilton	97.3	0.0	1.1	0.0	0.0	0.0	1.6	1.6	14.7
Bemidji	84.3	0.8	11.5	1.1	0.0	0.2	2.1	1.1	19.2
Cass Lake	30.1	0.0	64.4	0.0	0.0	0.2	5.2	0.0	29.0
Bena	24.5	0.0	70.0	0.0	0.0	0.0	5.5	0.0	58.0
Zemple	81.3	0.0	18.7	0.0	0.0	0.0	0.0	0.0	19.7
Cohasset	96.7	0.2	0.9	0.2	0.0	0.2	1.9	0.3	5.6
Warba	98.4	0.0	0.0	0.0	0.0	0.0	1.6	1.6	19.6
Deer River	84.1	0.0	12.1	0.2	0.0	0.0	3.7	0.0	17.3
Grand Rapids	95.5	0.3	1.9	0.7	0.0	0.4	1.1	0.9	11.2

TABLE 4.10.2-3 (continued)
Environmental Justice Statistics in Affected Communities along the Alberta Clipper Project Route

State/County	White (Not Hispanic) (%)	Black or African American (%)	Native American or Alaskan Native (%)	Asian (%)	Native Hawaiian and Other Pacific Islander (%)	Other (%)	Two or More Races (%)	Hispanic or Latino Origin (%)	Persons with Income below Poverty Level (%)
Minnesota (continued)									
La Prairie	98.3	0.0	1.3	0.0	0.0	0.0	0.3	0.0	10.0
Floodwood	97.2	0.0	1.0	0.2	0.0	0.0	1.6	0.8	19.4
Cloquet	88.2	0.2	9.3	0.4	0.0	0.1	1.7	0.6	9.9
Wrenshall	96.4	0.0	2.3	0.0	0.0	0.0	1.3	1.0	2.6
Wisconsin	**88.9**	**5.7**	**0.9**	**1.7**	**0.0**	**1.6**	**1.2**	**3.6**	**8.7**
Town of Superior	98.0	0.2	1.0	0.1	0.0	0.0	0.6	0.5	6.9
Village of Superior	96.8	0.6	1.0	1.2	0.0	0.2	0.2	0.2	3.8
Superior	94.3	0.7	2.2	0.8	0.0	0.3	1.7	0.8	13.4
Oliver	97.2	0.0	1.7	0.0	0.0	0.0	1.1	0.0	8.3

Note: Because Hispanics may be of any race and are included in applicable race categories, the sum of the percentages may exceed 100 percent.

Source: U.S. Census Bureau 2000.

Low-Income Populations

Low-income populations are defined as those living below the established poverty threshold. According to the U.S. Census Bureau, the poverty threshold for an individual was $10,590 in 2007. Poverty thresholds for a household vary depending on the number of people in a household and the number of minor children in the household. Low-income populations along the proposed pipeline route were identified using the poverty statistics from the U.S. Census and are summarized in Table 4.10.2-3.

Of the 27 communities in the region of influence, the poverty rates of 20 communities are higher than their respective states. The poverty rate for nine communities in Minnesota exceeds the state poverty rate by 100 percent. Five other communities in Minnesota and one community in Wisconsin exceed the state poverty rate by more than 50 percent. The highest poverty rate is in Bena, Minnesota (58.0 percent).

Two reservations (FDL and Leech Lake) would be crossed by the proposed Project. The communities of Bena and Cass Lake are both located within the LLR and, as previously discussed, over 50 percent of individuals in both communities are considered Native American/Alaskan Native. Enbridge is working closely with officials from the reservations to establish specific mitigation and compensation measures. For a more in-depth discussion of background and mitigation measures within the LLR, refer to Appendix U.

Summary

The Alberta Clipper Project could generate substantial adverse environmental, economic, or environmental justice effects in these communities. While two communities with high minority populations have been identified within the affected area, a majority of the communities crossed by the proposed Project have populations comprised predominately of white, non-Hispanics. However, as described below, the Alberta Clipper Project and its associated mitigation measures are not expected to result in adverse impacts that fall disproportionately on minority groups or low-income populations located along the pipeline route.

As described throughout this EIS, construction and operation of the pipeline are expected to generate a range of environmental impacts within the affected reservations, counties, and states. However, through the measures implemented by Enbridge, these impacts would be minimized or mitigated as applicable. The environmental justice analysis of any project also must consider the health and safety of the population in the region. Section 4.13 addresses the potential risks to public health and safety resulting from construction and operation of the pipeline. Because of compliance with stringent regulations and regular monitoring of pipeline integrity, it is not expected that the pipeline would pose a significant risk to the population. There is no evidence that health risks would be higher or would disproportionately impact low-income or minority populations.

Due to stringent safety and integrity measures that Enbridge has incorporated into the design, construction, and operation of the pipeline—as well as governing PHMSA pipeline safety regulations—the pipeline does not appear to pose significant risk to residents along the route, whether in rural or urban areas. Therefore, there is no evidence that such risks would be disproportionately borne by any minority group or low-income populations identified with the potentially affected communities in proximity to the Alberta Clipper Project. Further, while the transportation of oil by pipeline, including both crude oil and refined petroleum products, involves some risk to the public and the environment in the event of an accident or an unauthorized action and subsequent release of oil; the DOT (2009) reports that pipelines are the safest means to transport large volumes of hazardous liquids, such as oil.

The proposed Project would result in minor and temporary adverse effects on certain socioeconomic resources in the region, such as housing availability and public services. Conversely, the potential exists for positive economic impacts in the region of influence based on increased tax revenues through taxes on property, income, and goods. This generated tax would benefit those communities, tribes, and counties in the Project area, including minority groups and low-income populations. In addition, Enbridge has established compensatory and mitigation measures for the reservations and tribal communities.

Overall, the proposed Project is not expected to disproportionately affect any minority groups, low-income populations, or Native American tribes within the region of influence. The majority of the communities that would be crossed are predominately white (not Hispanic), with 19 of the 25 communities having a higher proportion of white (not Hispanic) than the state average.

4.10.3 Connected Actions

Based on the anticipated investment and expansion of the Superior Terminal, as discussed in Section 2.9.2, the region is expected to experience a range of socioeconomic impacts from this connected action. Cost associated with the expansion Project would stem from labor, materials, services, and equipment. Most of the construction-related economic impacts would occur over the 18-month construction period and would be temporary.

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4.11 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA), as amended, requires the lead federal agency with jurisdiction over a federal undertaking (i.e., a project, activity, or program that is funded by a federal agency or that requires a federal permit, license, or approval) to consider effects on historic properties before that undertaking occurs. A "historic property" is defined as any district, archeological site, building, structure, or object that is either listed, or eligible for listing, in the National Register of Historic Places (NRHP). Under this definition, other historic and archaeological resources may be present within a project's area of potential effect (APE) but are not historic properties if they do not meet the eligibility requirements for listing in the NRHP. For the purposes of this section, the term "historic resource" refers to buildings, structures, objects, and districts that may or may not meet NRHP criteria of evaluation. Likewise, the term "archaeological resource" refers to a site that may or may not meet the NRHP criteria of evaluation. The term "sites of religious and/or cultural significance" refers to areas of concern to Indian tribes that, in consultation with the respective tribe(s), may or may not be eligible for listing in the NRHP.

To be considered eligible for listing in the NRHP, a property generally must be greater than 50 years of age, although there are provisions for listing cultural resources of more recent origin if they are of "exceptional" importance. The intent of Section 106 is for federal agencies to take into account the effects of a proposed undertaking on any historic properties situated within the APE and to consult with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), federally recognized Indian tribes, applicants for federal assistance, local governments, and any other interested parties regarding the proposed undertaking and its potential effects on historic properties.

The implementing regulation of Section 106 is 36 CFR Part 800. This regulation establishes a process of identifying NRHP-eligible or -listed historic properties that may be affected by the proposed undertaking; assessing the undertaking's effects on those resources; and engaging in consultation that seeks ways to avoid, reduce, or mitigate any adverse effects on NRHP-listed or -eligible properties. Adverse effects include, but are not limited to, destruction or alteration of all or part of a property; isolation from or alteration of its surrounding environment; introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting; transfer or sale of a federally owned property without adequate conditions or restrictions regarding preservation, maintenance, or use; and neglect of a property resulting in its deterioration or destruction (36 CFR 800.5).

36 CFR Part 800 specifies that certain parties must be consulted. These parties include each State Historic Preservation Officer (SHPO) whose state would physically include any portion of the APE. Similarly, these parties include each Tribal Historic Preservation Officer (THPO) whose reservation lands would physically include any portion of the APE. The SHPO is appointed by each state to protect the interests of its citizens with respect to issues of cultural heritage. Section 101(b)(3) of the NHPA provides each SHPO a prominent role in advising the responsible federal agencies and ACHP in their efforts to carry out Section 106 requirements. The lead federal agency, as well as the SHPOs and Tribal Historic Preservation Officers (THPOs), have an obligation to work with state and local governments, tribes, private organizations, and individuals during the initial planning and development of the Section 106 process.

On non-tribal lands, DOS—in consultation with the SHPOs and other consulting parties—assesses the need for historic and archaeological resource investigations in the Project APE, generates and approves methodologies for conducting such investigations, and evaluates the preliminary NRHP status of any historical or archaeological resources located within the APE. The SHPO also assists the lead federal agency and ACHP to assess any potential effects to historic properties and works with the Project

applicant, lead federal agency, ACHP, and Indian tribes to mitigate any adverse effects that could occur to historic properties.

Consulting parties were initially invited to consult regarding the proposed Project on May 25, 2007, by the COE. DOS subsequently notified the consulting parties that it would be the lead federal agency for the Project and invited parties to consultation on October 16, 2007. On June 18, 2008, DOS determined the extent of the APE for the proposed Project and requested comments from consulting parties that included the SHPOs, Indian tribes, and other federal agencies. DOS will continue consultation as determinations are made concerning NRHP eligibility of identified resources, Project effects on historic properties, and resolution of adverse effects.

Section 106 recognizes the importance of consulting with Indian tribes for federal undertakings that are proposed within tribal ancestral territories. Specifically, 36 CFR 800.2(c)(2)(ii) notes: "Section 101(d)(6)(B) of the NHPA requires the agency official to consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural importance to historic properties that may be affected by an undertaking. This requirement applies regardless of the location of the historic property." In addition, sub-part (B) of the same statute says the "Federal Government has a unique legal relationship with Indian tribes set forth in the Constitution of the United States, treaties, statutes, and court decisions. Consultation with Indian tribes should be conducted in a sensitive manner respectful of tribal sovereignty. Nothing in this part alters, amends, repeals, interprets or modifies tribal sovereignty, any treaty rights, or other rights of an Indian tribe, or preempts, modifies or limits the exercise of any such rights."

The proposed Project alignment currently crosses approximately 42.7 miles of the LLR and 12.9 miles of the FDL Reservation. The Section 106 responsibilities described above can be assumed by a THPO under Section 101(d)(2) of the NHPA. In this event, all consultations regarding the Project and its potential effect on historic properties within the relevant tribal lands would be through the THPO or appropriate designated contact LLBO has a THPO and has therefore assumed Section 106 responsibilities for this Project for prehistoric historic properties. Both the LLBO THPO, FDL, and SHPO are consulted on architectural properties. FDL does not have a THPO; however, a cultural resource specialist has been designated by the tribe to consult with DOS. This individual is called the "FDL Contact" for the purposes of consultation. Consistent with 36 CFR 800.2(c)(2)(B), DOS is consulting with tribal representatives as well as the SHPO regarding the identification and evaluation of historic properties and the avoidance, minimization, and/or mitigation of Project effects to historic properties on the FDL Reservation. FDL retains the same rights of consultation and concurrence that THPOs are given in the Section 106 process, except that such consultations are in addition to and on the same basis as consultation with the SHPO. Both LLBO and FDL are consulting parties for this Project. The state SHPO still must be consulted relative to non-tribal lands. In the event that the tribe has not assumed the SHPO functions on its lands, the lead federal agency is required to consult with both the SHPO and the tribe's designated representative for any adverse effects anticipated for historic properties situated on the tribal lands.

Section 106 regulations state that each SHPO (or THPO, if they have assumed the SHPO's role) generally is required to respond within 30 days of receiving a request to review a proposed action or a request to review a federal agency's finding or determination regarding historic properties located within the Project APE. In the event that the SHPO/THPO does not respond within this timeframe, 36 CFR 800.3(c)(4) states that the lead agency can decide to (1) proceed to the next step in the Section 106 review process based on any earlier findings or determinations that have been made up to that point; or (2) consult directly with the ACHP in lieu of the SHPO/THPO. If, after this step is followed, the SHPO or THPO decides to re-enter the Section 106 process, 36 CFR 800.3(c)(4) further states that the lead agency official may continue the consultation proceeding without being required to reconsider previous findings or determinations.

DOS has elected to follow the assessment criteria for pipeline projects that have been developed by FERC, given their experience in these types of linear projects. For cultural resources, the relevant assessment schema is found in the "Guidelines for Reporting on Cultural Resources Investigations for Pipeline Projects," published by the FERC Office of Energy Projects in 2002. Unless otherwise stated, the statements made in this document to assess Section 106 compliance for the proposed Project have used those guidelines in their determination. Enbridge provided information, analyses, and recommendations to assist DOS in complying with NEPA and Section 106, in accordance with NHPA regulations.

As a whole, cultural resources are locations of human activity, occupation, or usage that contain materials, structures, or landscapes that were used, built, or modified by people. Cultural resources include spatially circumscribed areas of human activity, such as Pre-contact Native American archaeological sites, American farmsteads, or a district of historic buildings. For the purposes of the proposed Project, field studies to identify cultural resources were conducted for archaeological resources (sites) and for historic resources (buildings, structures, objects, and districts). To date, no studies of sites of religious or traditional significance have been completed within the Project corridor. Three Traditional Cultural Property (TCP) studies are currently underway. Not all archaeological resources, historic resources, or sites of religious and traditional significance are considered historic properties under Section 106. To be designated as a historic property, the resource must be listed, or eligible for listing, in the NRHP. The criteria (36 CFR 60.4 [a–d]) used to evaluate the significance of a resource are as follows:

- It is associated with events that have made a significant contribution to the broad patterns of American history; or
- It is associated with the lives of past significant persons; or
- It embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- It has yielded or may be likely to yield, information important in history or prehistory.

This analysis includes a summary of all cultural resources that have been reported to DOS for the proposed Project. This includes cultural resources that are listed in the NRHP, NRHP-eligible historic properties, cultural resources assessed as being ineligible for listing in the NRHP, and cultural resources for which NRHP eligibility has not been evaluated. The reported cultural resources are divided into three main temporal groupings: Pre-contact period, Historic period, and multi-component. Pre-contact resources are sites that contain material evidence of Native American activities before Europeans entered the Project area. Examples of Pre-contact sites include, but are not limited to, rock art; camp or village sites; rock shelters; and lithic, bone, or ceramic scatters. Historic period resources can include recent Native American activity locations but also may reflect Euro-American activities of the last 250 years. These can include residential, government, or commercial structures; farmsteads; mining sites; roads or railways; and ceramic, metal, and glass artifact scatters. Multi-component resources are locations where both Historic period and Pre-contact cultural remains are present.

Historic properties can include TCPs, as well as sites of religious or cultural importance that meet the above criteria of eligibility but that do not necessarily have physical evidence of human activity. Bulletin #38 of the National Register defines TCPs as locations that embody the "beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived

from the role the property plays in a community's historically rooted beliefs, customs, and practices" that are essential for continuing the cultural identity of the community.

DOS has requested in writing and through meetings that consulting parties provide information on properties of religious or cultural significance so that adverse effects can be avoided or addressed. These requests were made to federally recognized Indian tribes, as described in Section 4.11.3.3. Requests for the identification of TCPs of significance were made through open public meetings with local community members as well as correspondence. LLBO, FDL, and the Mille Lacs Band of Ojibwe have agreed to complete a TCP study of the Project corridor. The studies are ongoing. LLBO and FDL have also participated in cultural resource surveys conducted on their respective reservations to ensure that appropriate methodologies for locating and identifying tribal resources are used. The LLBO's Heritage Sites Program conducted and prepared the cultural resource report for the proposed Project corridor in the LLR. DOS has been consulting with FDL regarding cultural resource surveys on and off the reservation to identify areas of concern.

A Programmatic Agreement (PA) will be used to conclude Section 106 review. The PA will ensure that cultural resource surveys will be completed in areas where Project adjustments occur, where TCPs may be identified by tribes, or where access to private property is currently restricted. The use of the PA for this Project is justified under 36 CFR 800.4(b)(2), when "alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification and evaluation efforts." Furthermore, consistent with 36 CFR 800.14(b), DOS will defer final identification and evaluation of historic properties pursuant to the provisions in the PA. The Draft Final PA for the Project is provided in Appendix R.

In addition to Section 106, the Archaeological Resources Protection Act of 1979 (ARPA) (25 CFR 262.3) requires federal land-owning agencies to issue ARPA permits to qualified individuals, institutions, or firms that conduct archaeological surveys on federal and tribal lands. The proposed Project has the potential to be within federally controlled, maintained, managed, or owned lands—including the LLR, CNF, and FDL Reservation. For the two respective reservations, BIA would be responsible for supplying ARPA permits for archaeological investigations, while the Forest Service would be responsible for supplying ARPA permits on national forestlands. An ARPA permit can be granted by BIA only if the respective tribe with jurisdiction over the land consents. Terms and conditions may be added to the permit by the jurisdictional tribe. Tribal conditional permits to conduct archaeological surveys on reservation lands may also be required by the tribe.

The Native American Graves Protection and Repatriation Act (NAGPRA) applies to all federal and tribal lands. NAGPRA effectively protects tribal burial sites and rights to items of cultural significance, including human remains, funerary objects, sacred objects, and objects of cultural patrimony (25 USC 3001[3]). On federal and tribal lands, intentional excavation and removal of Native American human remains and objects for discovery, study, or removal is permissible only if an ARPA permit is issued by a federal land-holding agency. Consultation with Native Americans must occur prior to the issuance of an ARPA permit, and removal of human remains and objects requires the consent of the applicable Native American tribe. NAGPRA applies to all lands affected by the proposed Project that are within the boundaries of the LLR, CNF, and FDL Reservation and any other lands where the federal government exerts sufficient control over property interests. North Dakota (North Dakota Century Code 23-06-27; North Dakota Administrative Code Chapter 40-02-03), Minnesota (Minnesota Historic Sites Act of 1965; Field Archaeology Act of 1963; Minnesota Private Cemeteries Act of 1976), and Wisconsin (State Statute 157.70) each have statutes that govern the inadvertent discovery and/or excavation of human remains as well as artifacts. Unanticipated Discovery Plans were prepared for North Dakota, Minnesota, and Wisconsin to provide a clear process of notification and consultation. FDL has indicated that it will not permit the removal of Native American human remains and/or funerary objects from tribal lands.

4.11.1 Environmental Setting

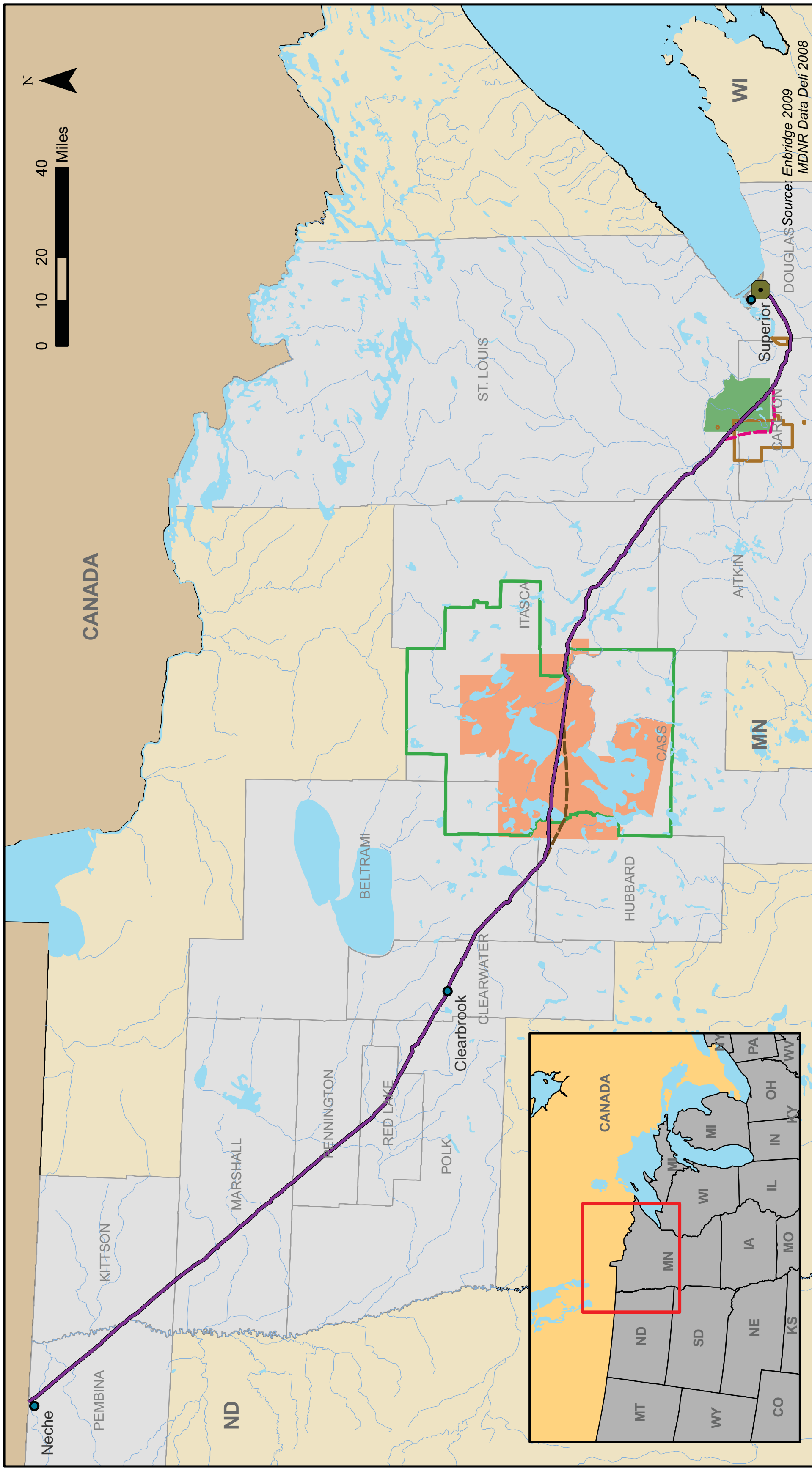
The proposed Project crosses three states (North Dakota, Minnesota, and Wisconsin) and approximately 42.7 miles of the LLR and 12.9 miles of the FDL Reservation. The general Project area contains numerous cultural resources resulting from human settlement and other activities over the last 10,000 years. These include archaeological sites, special activity areas such as wild rice processing sites, cemeteries, and sites of spiritual and traditional use. Later historic activities expressed on the landscape include fur trade-related resources, Forest Service administrative sites, railroads, commercial buildings, domestic residences, and agricultural buildings. Many of these cultural resources are associated with mineral exploration, transportation, settlement, logging, fur trapping, resorts, and recreational residences. Lands and resources both within and outside the respective reservations are very important to Native American peoples for subsistence gathering, for the collection of plants for medicines, for spiritual and ceremonial purposes, and for everyday life. It should also be noted that the FDL Reservation is located within the larger 1854 Ceded Territories (or the so-called "Arrowhead" region of northeast Minnesota) that remain subject to the 1854 Treaty of LaPointe. As a part of this Treaty, the FDL, as well as the Bois Forte and Grande Portage Bands retain usufructuary rights that include hunting, fishing, and gathering[6] The proposed Project route bisects sections of the 1854 Ceded Territories to the north and south of the FDL Reservation. The proposed Project route also bisects the 1855 Ceded Territory, which is located in central Minnesota. This section of the EIS, therefore, summarizes the cultural resources aspects of the Alberta Clipper Project in relation to each individual affected state and the reservations and territories contained therein.

For the purposes of the proposed Project and Section 106 of the NHPA, the APE consists of a 140-foot-wide construction workspace that would primarily be collocated along existing Enbridge pipeline facilities/easements and extending from the centerline of the closest (outermost) existing Enbridge pipeline. The APE also includes two major route alternatives: the GLG Alternative across the CNF and LLR, and the current FDL Alternative around the FDL Reservation (see Figure 4.11.1-1 and Table 4.11.1-1).

TABLE 4.11.1-1
Area of Potential Effect for the Alberta Clipper Project by State

State	Counties	Corridor Area of Potential Effect
North Dakota	Pembina	140 feet from centerline of outermost existing Enbridge pipeline
Minnesota	Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Beltrami, Hubbard, Cass, Itasca, Aitkin, St. Louis, and Carlton	140 feet from centerline of outermost existing Enbridge pipeline
Wisconsin	Douglas	140 feet from centerline of outermost existing Enbridge pipeline

6 Usufructuary rights can be defined as the right of enjoying all the advantages derivable from the use of something belonging to another.



Legend

- Alberta Clipper Pipeline
- Superior Terminal Expansion Project
- Fond du Lac Alternative
- Great Lakes Gas Alternative
- Chippewa National Forest
- Fond du Lac State Forest
- Fond du Lac Indian Reservation
- Leech Lake Indian Reservation

ALBERTA CLIPPER PROJECT

FIGURE 4.11.1-1
AREA OF POTENTIAL EFFECT*

*The Area of Potential Effect (APE) = 140 feet from centerline of outermost existing Enbridge pipeline.

In addition to the 140-foot-wide construction workspace, the APE would include other Project-related construction areas. These other Project-related construction areas include civil/environmental crossings at waterbodies, roads, railroads, existing pipelines, utilities, and HDD/boring sites. These proposed crossings may require additional workspace of up to 75 feet in width and 300 feet in length on either side of the crossing. The APE also includes proposed workspaces such as pipe storage and contractor yards, access roads, and other aboveground facilities such as pump stations and valves. For pipe storage and contractor yards only, the APE extends 500 feet beyond the proposed construction workspace to evaluate possible visual effects. The distance may be reduced in instances where existing structures or vegetation reduce visibility. Lastly, the APE may also be adjusted should minor route adjustments or alternatives become necessary. Due to the nature of current Project planning, not all of these additional areas have necessarily been identified. Once they are identified, DOS will ensure that cultural resource surveys are conducted for these locations in consultation with the consulting parties. Figure 4.11.1-1 identifies the route of the pipeline through the affected states.

4.11.1.1 North Dakota

The Alberta Clipper pipeline would enter North Dakota from Canada and would extend through the state for approximately 28 miles. The only county crossed would be Pembina. The 106 Group was contracted on behalf of Enbridge to perform the required cultural resource surveys and assessments within the state.

The 106 Group draft Class I and III survey report was submitted to the North Dakota SHPO on December 20, 2007, and was prepared to simultaneously identify and evaluate resources as well as provide recommendations concerning effects stemming from the LSr Project and the Alberta Clipper Project (Bielakowski 2007a). For the purposes of Section 106 and NEPA, these two projects represent two separate undertakings. Due to the close physical proximity of the two projects, the effects on cultural resources within their respective corridors would essentially be identical. An additional draft "Addendum Report for Access Roads and Reroutes" was submitted to DOS (Doperalski and Van Erem 2008a-g) and an additional management summary for Addendum Report II has also been submitted to DOS. The draft Addendum Report II will be reviewed by DOS upon its receipt. Consultation regarding the Addendum Report II will occur following DOS review. The reports and management summary are listed below:

- Bielakowski, A. et al. 2007a. Class I and III Cultural Resources Survey for the Enbridge Pipelines' Southern Lights 20-Inch Crude Line (LSr) and Alberta Clipper Pipeline Projects, Pembina County, North Dakota. The 106 Group, Ltd. St. Paul, Minnesota.
- Doperalski, M. and S. Van Erem. 2008a. Draft Addendum I (Access Roads and Reroutes) to Class I and III Cultural Resources Survey for Enbridge Pipelines' Southern Lights 20-Inch Crude Line (LSr) and Alberta Clipper Pipeline Projects, Pembina County, North Dakota. The 106 Group, Ltd. St. Paul, Minnesota.
- Doperalski, M. and Miranda Van Vleet. 2008e. Draft Addendum II to Class I and III Cultural Resources Survey for Enbridge Pipelines' Alberta Clipper Pipeline Project, Pembina County, North Dakota. Addendum II. The 106 Group Ltd. St. Paul, Minnesota.

Before beginning fieldwork, the 106 Group prepared a previous investigations overview and survey implementation plan for the proposed corridor (Ketz et al. 2006). Information searches, conducted in 2006 and 2007, collected cultural site and survey data that were housed at the State Historical Society of North Dakota (Bielakowski et al. 2007a). The information was reviewed in relation to a corridor that extended for the length of the proposed pipeline route and that was 1 mile wide, centered on the route's proposed centerline. The records search identified 19 archaeological resources within this region. The resources included 12 Pre-contact sites, six Historic period sites, and one multi-component site with both

Historic period and Pre-contact cultural components. Of all these previously identified sites, only 32PB161 was recommended as potentially eligible.

Along with the literature review, the 106 Group submitted its research design for cultural resource field studies to the North Dakota SHPO in December 2007 (Bielakowski et al. 2007a). The purpose of the research design was to present the methods the 106 Group would use to assess the Alberta Clipper Project and identify historic properties. It was based on the results of the site file research and results of previous surveys. Based on the previous investigations and survey implementation plan, as well as several subsequent reports a total of 500.5 acres of the Project route was determined to have been previously surveyed for archaeology according to current federal and state standards. The remaining 286.37 acres of the corridor was determined to require a Class III archaeological survey of the proposed Alberta Clipper Pipeline Project. Since no systematic architectural survey had been conducted in the Project area, the entire corridor was surveyed for architectural resources. The procedures used to identify historic properties of cultural or religious importance to Indian tribes, including TCPs, are outlined in the discussion of the consultation process (see Section 4.11.3).

4.11.1.2 Minnesota

The Alberta Clipper pipeline would enter Minnesota from North Dakota and would extend through the state for approximately 285.8 miles. The counties crossed include Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Beltrami, Hubbard, Cass, Itasca, Aitkin, St. Louis, and Carlton. The 106 Group was contracted on behalf of Enbridge to perform the required cultural resource assessments within non-federal lands of the state. The 106 Group have submitted reports for Minnesota to DOS covering from the North Dakota border to the Wisconsin border. The report for the corridor between the North Dakota border and Clearbrook, Minnesota was prepared to simultaneously identify and evaluate resources, as well as provide recommendations concerning effects stemming from the LSr Project and the Alberta Clipper Project (Bielakowski 2007b). For the purposes of Section 106, these two projects represent two separate undertakings. Due to the close physical proximity of the two projects, however, the effects on cultural resources within their respective corridors would essentially be identical. The Heritage Sites Program of LLBO was contracted on behalf of Enbridge to complete assessments on the LLR and CNF (Wells and Olmanson 2008a, 2008b). Additional draft reports have been submitted to DOS for the Project segment through the FDL Reservation, the corridor from Clearbrook, Minnesota, to the Wisconsin border, for access roads and re-routes, a Phase II Architectural History Survey of a Proposed Contractor Yard, and several addendum reports. These reports are listed below:

- Bielakowski, A. et al. 2007b. Draft Phase I Cultural Resources Survey for the Enbridge Pipelines' Southern Lights 20-Inch Crude Line (LSr) and Alberta Clipper Pipeline Projects, Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater Counties, Minnesota. Volumes I and II. The 106 Group, Ltd. Minneapolis, Minnesota.
- Doperalski, M. and S. Van Erem. 2008b. Draft Addendum I (Access Roads and Reroutes) to Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights 20-Inch Crude Line (LSr) and Alberta Clipper Pipeline Projects, Kittson, Marshall, Pennington, Red Lake, Polk, and Clearwater Counties, Minnesota..
- Wells, C. R. and T. Olmanson. 2008a. Draft Phase I Archaeological Reconnaissance Survey for the Enbridge Alberta Clipper Petroleum and Southern Lights Diluent Pipeline Expansion, LLR and Chippewa National Forest, Cass, Hubbard, and Itasca Counties, Minnesota. Leech Lake Band of Ojibwe, Heritage Sites Program, Cass Lake, Minnesota.
- Wells, C. R. and T. Olmanson. 2008b. Phase I Archaeological Reconnaissance Survey for the Enbridge Alberta Clipper and Southern Lights Diluent Projects, LLR and Chippewa

National Forest, Cass, Hubbard, and Itasca Counties, Minnesota. Leech Lake Band of Ojibwe, Heritage Sites Program, Cass Lake, Minnesota.

- Doperalski, M. and Miranda Van Vleet. 2008f. Addendum I to Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Albert Clipper Pipeline Projects, Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Beltrami, Hubbard, Cass, Itasca, Aitkin, St. Louis, and Carlton Counties, Minnesota. The 106 Group Ltd. St. Paul, Minnesota.
- Bastis, Kristen, Miranda Van Vleet, and Saleh Van Erem. 2008. Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Pipeline Projects' Proposed Contractor Yards in Kittson, Marshall, Polo, Hubbard, Itasca, St. Louis, and Carlton Counties, Minnesota. The 106 Group, Ltd. St. Paul, Minnesota.
- The 106 Group, Ltd. 2008c. Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Pipeline Projects, St. Louis and Carlton Counties, Minnesota (FDL Reservation Traverse Letter Report). St. Paul, Minnesota.
- The 106 Group, Ltd. 2008d. Phase II Architectural History Survey of a Proposed Contractor Yard for Enbridge Pipelines' Southern Lights 20-Inch Crude Line (LSr) and Alberta Clipper Pipeline Projects, Kennedy, Kittson County, Minnesota. St. Paul, Minnesota.
- Doperalski, M. et al. 2008h. Phase I and II Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Pipeline Projects, Clearwater, Beltrami, Hubbard, Cass, Itasca, Aitkin, St. Louis, and Carlton Counties, Minnesota. The 106 Group, Ltd. St. Paul, Minnesota.
- Doperalski, M., S. Van Erem, and M. Van Vleet. 2009. Addendum II to Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Albert Clipper Pipeline Projects, Kittson, Marshall, Pennington, Red Lake, Polk, Clearwater, Beltrami, Hubbard, Cass, Itasca, Aitkin, St. Louis, and Carlton Counties, Minnesota. Volumes I and II. The 106 Group Ltd. St. Paul, Minnesota.

Before beginning fieldwork, the 106 Group prepared a previous investigations overview and survey implementation plan for the proposed corridor (Ketz et al. 2006). The LLBO completed a similar previous investigations overview and methodology statement within their Phase I report. It should be noted that, on the LLR, the area of survey coverage is delineated in miles of Project corridor while in the remaining Project areas, the area of survey coverage was delineated in acres. After reviewing reports of previous cultural resource investigations, the 106 Group determined that a total of 3,114.9 acres of the Project route in Minnesota (exclusive of federal lands) had been previously surveyed for archaeology according to current federal and state standards and generally extended beyond the Alberta Clipper Pipeline Project corridor. No additional survey work therefore was conducted in these areas. The remaining 3,869 acres of the corridor were determined to require a Phase I archaeological survey. In addition to the corridor, the 106 Group surveyed 10 proposed contractor/pipe yards that consisted of 562.9 acres. LLBO reported that, of the 43 miles that composed the Project corridor situated within LLR/CNF, approximately 24.4 miles had yet to be surveyed for archaeology. During the course of the survey on the reservation, approximately 5.9 miles of the survey corridor were inundated and could not be assessed for cultural resources.

As no systematic architectural resource survey had been completed along the entire Alberta Clipper Pipeline Project corridor in Minnesota, the 106 Group surveyed the entire (non-federal) corridor for architectural resources. The 42-mile corridor through the LLR/CNF has also been surveyed for architectural resources (Doperalski et al. 2008c).

Historic property surveys have been completed for both the proposed Alberta Clipper Pipeline corridor through the FDL Reservation and the FDL Alternative around the FDL Reservation. A draft report for the Project route through Minnesota from Clearbrook to the Wisconsin border has been submitted to DOS (Doperalski et al. 2008c). A letter report covering the Project corridor through the FDL Reservation has also been submitted to DOS for review (The 106 Group 2008a). Additional reports for archaeological testing on the LLR and for Project access roads, re-routes, and any other unsurveyed areas will be submitted to DOS for review under the stipulations of the PA. A Draft Final PA is provided in Appendix R.

4.11.1.3 Wisconsin

The Alberta Clipper pipeline would enter Wisconsin from Minnesota and would extend through the state for approximately 13.1 miles. The only county crossed would be Douglas. The 106 Group was contracted on behalf of Enbridge to perform the required cultural resource assessments within the state. The reports include:

- Doperalski, M. et al. 2008d. Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Projects, Douglas County, Wisconsin. The 106 Group Ltd. St. Paul, Minnesota.
- Doperalski, M. and Miranda Van Vleet. 2008g. Addendum I (Management Summary) to Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Pipeline Projects, Douglas County, Wisconsin. The 106 Group Ltd. St. Paul, Minnesota.
- Doperalski, M. et al. 2009. Addendum II to Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Projects, Douglas County, Wisconsin. The106 Group Ltd. St. Paul, Minnesota.
- Doperalski, M. et al. 2008. Superior Terminal, Wisconsin, Phase I Cultural Resources Survey for Enbridge Pipelines' Southern Lights Diluent and Alberta Clipper Projects, Douglas County, Wisconsin. The106 Group Ltd. St. Paul, Minnesota.

The procedures used to identify historic properties of cultural or religious importance to Indian tribes, including TCPs, is outlined in the discussion of the consultation process (see Section 4.11.3).

Before beginning fieldwork, the 106 Group prepared a previous investigations overview and survey implementation plan for the proposed corridor (Ketz et al. 2006). After reviewing reports of previous cultural resource investigations, the 106 Group determined that a total of 110.7 acres of the Project route in Wisconsin had been previously surveyed for archaeology according to current federal and state standards and generally extended beyond the Alberta Clipper Pipeline Project corridor; therefore, no additional survey work was conducted in these areas. The remaining 689.35 acres of the corridor were determined to require a Phase I archaeological survey of the proposed Alberta Clipper Pipeline Project corridor from the Wisconsin/Minnesota border to Superior, Wisconsin. The previous investigations overview and survey implementation plan also determined that no systematic architectural survey had been completed within the Alberta Clipper Pipeline Project corridor. Therefore, the 106 Group conducted an architectural survey of the entire proposed Project corridor from the Wisconsin/Minnesota border to Superior, Wisconsin (Doperalski et al. 2008d).

4.11.2 Potential Effects, Mitigation, and Avoidance Measures

Section 106 of the NHPA (as codified in 36 CFR 800.5) requires federal agencies to apply the "criteria of adverse effect" to determine whether a project will affect historic properties. Adverse effects are found when an undertaking alters, directly or indirectly, the characteristics of a historic property that qualify it for inclusion in the NRHP, in a manner that diminishes the historical integrity of the property. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be distant, or be cumulative.

For the Alberta Clipper Project, the principal types of adverse effects that would occur include physical destruction or damage, to all or part of the property, caused by pipeline trenching or related excavations or boring; introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features by short-term pipeline construction or construction of aboveground facilities and roads; and change in the character of the property's use or of physical features within the property's setting that contribute to its significance.

Under Section 106 regulations, historic properties are effectively classified into three basic categories: not eligible, eligible, and unevaluated. Historic properties that are classified as "not eligible" do not possess the qualities of significance as defined by the NRHP criteria for evaluation (as defined in 36 CFR 60.4 [a–d]). Therefore, they are not historic properties (as defined in 36 CFR 800) and do not generally require mitigation. Historic properties—including properties of religious or cultural significance (including TCPs) to Indian tribes—that are designated as eligible by the lead federal agency and SHPO/THPO meet the NRHP criteria for evaluation; these are considered historic properties under Section 106 guidelines. Adverse effects must be avoided for a finding of No Adverse Effect to be attached to a historic property. If adverse effects to the property cannot be avoided, mitigation treatment plans must be developed in consultation with the lead federal agency, SHPO, ACHP, Indian tribes, and other relevant consulting parties. In the discussions below, historic properties also are categorized as potentially eligible and/or unevaluated. This designation simply means that insufficient data were currently available for DOS to state definitively that the cultural resource does, or does not, meet the criteria of evaluation for listing in the NRHP. As each of these sites has the potential to be a Section 106-defined historic property, the site must either be further assessed through NRHP evaluation procedures or must be treated as a de facto historic property. If the latter option is selected, avoidance plans must be developed in order to prevent any impact to the cultural remains or features that are present.

To limit adverse effects to historic properties, and in line with FERC guidelines, Enbridge is instituting plans to avoid effects to historic properties that are unevaluated or that have been found eligible for listing in the NRHP. Avoidance can be achieved by rerouting the pipeline corridor and related appurtenances, keeping construction activities away from NRHP-eligible properties by using a physical barrier or buffer, limiting the impact to existing demonstrated disturbance areas, or digging underneath the cultural deposits by boring or HDDs. Prior to construction commencing in the area, Enbridge would be required either (1) to file with DOS the results of NRHP assessments demonstrating that historic properties designated as unevaluated are not historic properties; or (2) to provide plans that detail the specific avoidance procedures to be implemented in order to avoid impact to each eligible and unevaluated site, using the procedures described below. DOS and the consulting parties would evaluate the submitted information, following the protocols outlined in the PA developed for the proposed Project.

The following mitigation measures are applicable for historic properties determined to be eligible historic properties or unevaluated properties, for a finding of No Effect or No Adverse Effect:

(1) Avoidance through re-route.

For each re-route, Enbridge would file with DOS a map at 1:24,000 scale or greater that clearly shows with mileposts the original surveyed corridor, the known boundaries of the eligible or unevaluated property, the re-route that avoids the property, and survey information showing that no historic properties are located within the re-route and/or that a sufficient distance or buffer exists between the re-route and the site.

(2) Avoidance through abandonment.

For each abandonment, Enbridge would file with DOS a letter that states the facility or road at which the eligible or unevaluated property was located and a statement that the facility or road is no longer associated with the Project.

(3) Avoidance through bore or HDD.

For each instance, Enbridge would file with DOS a map and technical drawing that clearly shows the projected depth below surface and the entrance and exit points of the drill in relation to the boundaries of the eligible or unevaluated property.

(4) Avoidance by narrowing the construction corridor (“neck down”).

For each instance, Enbridge would file with DOS an alignment sheet map at 1:500 scale or greater that clearly shows the construction corridor (including additional temporary workspace) in relation to the eligible or unevaluated property boundary. Prior to any construction commencing in the area, safety fencing must be erected as a buffer along the relevant outer edges of the eligible or unevaluated property. A qualified monitor must be present during installation of the pipeline in that area to ensure that accidental adverse effects do not occur to the property.

(5) Avoidance by limiting impact to the existing roadway.

For each instance, Enbridge would file with DOS an alignment sheet map at 1:500 scale or greater that clearly shows the access road in relation to the eligible or unevaluated property, a description of the existing state of the roadway, and a statement that Project traffic would be limited entirely to the existing roadway and that the road would not be widened or upgraded as a result of the Project.

Short-term construction-related effects would be mitigated by implementing measures such as the use of construction mats. If adverse effects do occur to any eligible historic property or unevaluated cultural resource, they would be resolved through consultation with all consulting parties.

4.11.2.1 North Dakota

For the Class I and III survey (as included in the three reports for North Dakota), the 106 Group conducted a pedestrian survey for 286.37 acres and a pedestrian survey and shovel probes for 29.92 acres. The survey included excavation of 689 shovel tests in areas that were assessed as warranting subsurface investigation. The survey did not re-evaluate 10 sites (32PBX099, 32PB0152, 32PB0155, 32PB0159, 32PB0160, 32PBX0215, 32PBX0216, 32PBX0217, 32PBX0220, and 32PBX0222) because they were previously surveyed in 1994 to current federal and state standards by IMA as part of the Lakehead Pipeline Project (Breakey et al. 1994a, 1994b). All 10 sites were recommended as not eligible for listing in the NRHP in previous investigations and they lie outside of the survey corridor. The 13 sites that were assessed by the 106 Group through both pedestrian surveys and subsurface testing in the form of shovel

probes include 32PB0206, 32PBX0161, 32PBX0165, 32PB0205, 32PB0161, 32PBX0212, 32PBX213, 32PBX214, 32PBX219, 32PB0158, 32PBX166, 32PB0162, and 32PBX0218. Of these sites, only 32PB0206 and 32PB0161 were recommended as eligible for listing in the NRHP, and the remainder were recommended as not eligible for listing in the NRHP. Avoidance of sites 32PB0206 and 32PB0161 by boring was recommended by the 106 Group.

On February 26, 2008, in complying with Section 106 for the LSr Project, DOS determined that site 32PB0206 met the criteria of evaluation for listing in the NRHP (36 CFR 60.4 [a–d]) and that it would be avoided by HDD/boring. Site 32PB0161 was determined unevaluated by DOS but would be avoided by HDD/boring. Only one historical site, the Duluth and Manitoba Railroad (32PB0173), was identified during the architectural survey; and it was determined eligible for listing in the NHRP by DOS. All other sites were determined to be not eligible for listing in the NRHP. On February 28, 2008, the North Dakota SHPO concurred with the eligibility determinations and the scale and scope of identification efforts (ND SHPO Tracking #06-1063) (Table 4.11.2-1).

TABLE 4.11.2-1
Historical and Archaeological Resources Identified in North Dakota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Determination by DOS	Action Required by Enbridge	North Dakota SHPO Concurrence with DOS Finding
32PBX0057	Previously identified Historic isolate	Previously determined not eligible	Not eligible	No further work	Concur
32PBX0099	Previously identified Historic homestead	Not eligible	Not eligible	No further work	Concur
32PBX0161	Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0165	Historic artifact scatter	Not eligible	Not eligible	No further work	Concur
32PBX0166 (no longer in Project corridor)	Previously identified potential Pre-contact mound	Area of site within APE not eligible	Not eligible	No further work	Concur
32PBX0212	Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0213	Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0214	Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0215	Previously identified Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0216	Previously identified Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0217	Previously identified Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur

TABLE 4.11.2-1 (continued)
Historical and Archaeological Resources Identified in North Dakota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Determination by DOS	Action Required by Enbridge	North Dakota SHPO Concurrence with DOS Finding
32PBX0218	Isolated Pre-contact artifacts	Not eligible	Not eligible	No further work	Concur
32PBX0219	Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0220	Previously identified Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PBX0222	Previously identified Pre-contact isolated find	Not eligible	Not eligible	No further work	Concur
32PB0152	Previously identified Historic artifact scatter	Not eligible	Not eligible	No further work	Concur
32PB0153	Previously identified multi-component artifact scatter	Previously determined eligible, recommended not eligible	Not eligible	No further work	Concur
32PB0155	Previously identified multi-component artifact scatter	Not eligible	Not eligible	No further work	Concur
32PB0158 (no longer in Project corridor)	Previously identified historic artifact scatter	Not eligible	Not eligible	No further work	Concur
32PB0159	Previously identified historic artifact scatter	Not eligible	Not eligible	No further work	Concur
32PB0160	Previously identified historic artifact scatter	Not eligible	Not eligible	No further work	Concur
32PB0161	Pre-contact artifact scatter	Potentially eligible (previous recommendation)	Unevaluated	Avoid by bore/HDD	Concur
32PB0162	Historic artifact scatter	Not eligible	Not eligible	No further work	Concur
32PB0173	Segment of historic railroad	Eligible	Eligible	Avoid by bore/HDD	Concur
32PB0205	Undetermined isolated find	Not eligible	Not eligible	No further work	Concur
32PB0206	Historic oxcart trail/road	Eligible	Eligible	Avoid by bore/HDD	Concur

APE = Area of potential effect
HDD = Horizontal Directional Drill
NRHP = National Register of Historic Places
SHPO = State Historic Preservation Officer

An additional cultural resource survey for Project access roads and re-routes was completed in June 2008, and an Addendum II Report was completed in November 2008. The survey did not reevaluate one site (32PB0153) as it had been previously surveyed in 1994 by IMA as part of the Lakehead Pipeline Project to current federal and state standards (Breakey et al. 1994a, 1994b). Although site 32PB0153 was originally designated as eligible for listing in the NRHP, the contributing portion of the site is now designated as a separate site (32PB0206) leaving site 32PB0153 as no longer eligible. This change in eligibility has been confirmed with the SHPO (Bielakowski et al. 2007a). The three sites that were assessed by the 106 Group through both pedestrian surveys and subsurface testing in the form of shovel probes include 32PBX0057, 32PB0158, and 32PBX0166. All three sites were recommended as not eligible for listing in the NRHP.

No remaining sections of the pipeline corridor in North Dakota need to be surveyed for historic properties at this time, and no further evaluative testing is planned. The cultural resource surveys for Project re-routes, route revisions, gap analysis, and extra workspaces have been completed. DOS has made determinations of eligibility and effect on all resources recorded in North Dakota, and the North Dakota SHPO has concurred with all determinations. Any additional cultural resource survey work conducted on the Project once the EIS is finalized will be completed under the stipulations of the PA. The Draft Final PA appears in Appendix R.

4.11.2.2 Minnesota

For the Phase I survey, the 106 Group conducted a pedestrian survey for 3,596.7 acres and a pedestrian survey and shovel probes for 305.1 acres. The survey included excavation of 6,427 shovel tests in 66 areas. During the Phase I survey for the Alberta Clipper Pipeline Project, the 106 Group identified 20 new archaeological sites in Minnesota. Eighteen of the sites were recommended as not eligible for listing in the NRHP. Based on Phase I investigations, sites 21BL0283 and 21BL0284 were recommended as potentially eligible for listing in the NRHP. For each of these sites, the 106 Group recommended avoidance by HDD or boring. Twenty-seven previously recorded sites were identified by the 106 Group, and 13 were intensively surveyed with shovel probes. The remaining 14 sites included seven sites on the LLR/CNF, and seven sites that did not require resurvey as they had been previously surveyed to current federal and state standards and recommended as not eligible for listing in the NRHP. Of the previously recorded sites, three sites, 21MA0039, 21CA0569, and 21CE0060, were recommended as eligible for listing in the NRHP. Avoidance by HDD was recommended for site 21CE0039. Sites 21CA0569 and 21CE0060 would be avoided by a re-route. Ten archaeological resources (21BL0283, 21BL0284, 21CA0169, 21CA0315, 21CA0696, 21CA0697, 21CA0698, 21CA0699, 21HB0064, and 21IC0345) were determined by DOS to be unevaluated and would be avoided either by bore/HDD or re-route, or subjected to Phase II testing and NRHP evaluation.

On the LLR/CNF, the LLBO Heritage Sites Program conducted a surface reconnaissance survey of approximately 1,197 acres and excavated 1,173 shovel tests. The Heritage Sites Program identified seven sites as being potentially eligible for listing in the NRHP and recommended either avoidance or NRHP eligibility testing. These sites include 21HB0064, 21CA0699, 21CA698, 21CA0697, 21CA0696, CNF-903031115, and 21IC0345. Since the submittal of the report, Enbridge has committed to avoiding sites 21CA169, 21CA569, and CNF-903031115. Due to route adjustments, Enbridge will also be conducting NRHP testing of site 21CA315.

The 106 Group identified 162 historic resources 45 years of age or older within the APE of the pipeline corridor and the contractor yards. Twenty-nine of these properties are railroads or railroad-related structures or corridors. Ten of the railroads had been previously determined to be eligible, and 16 were recommended as eligible for listing. One of the railroads (BL-BUZ-008) was determined to be unevaluated by DOS. A railroad grade (IC-CHC-007), a railroad trestle (KT-SKT-007), and a railway

corridor (BL-WLC-009) were evaluated as eligible for listing in the NRHP. Six buildings were evaluated as eligible for listing in the NRHP. This included a stone building (HB-HEL-009), Sawyer Public School (CL-SAW-001), Cass Lake Times Building (CA-CLC-017), and two granaries (KT-DAV-002 and KT-SKT-008). All of the NRHP-eligible railroads and buildings would be avoided by boring/HDD or were determined not to be adversely affected by Project activities. Three other historical resources (09-03-03-1115, IC-DRT-004, and PL-GLT-002) were determined by DOS to be unevaluated. For all unevaluated properties, Project plans have either been altered to avoid these properties or DOS is awaiting Phase II evaluations. The remaining 125 historical resources were recommended as not eligible for listing in the NRHP (See Table 4.11.2-2).

TABLE 4.11.2-2
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
21BL0199	Previously identified Post-contact outbuilding	Not eligible (previous determination)	Not eligible	No further work	Pending
21BL0200	Previously identified Post-contact lumber camp	Not eligible; (Phase II evaluation resulted in finding not eligible)	Not eligible	No further work	Pending
21BL0281	Pre-contact pottery scatter	Not eligible (Phase II evaluation resulted in finding not eligible)	Not eligible	No further work	Pending
21BL0282	Isolated Pre-contact flake	Not eligible	Not eligible	No further work	Pending
21BL0283	Pre-contact artifact scatter	Potentially eligible	Unevaluated	Avoid by bore/HDD	Pending
21BL0284	Pre-contact artifact scatter	Potentially eligible	Unevaluated	Avoid by bore/HDD	Pending
21CA0169 (Site also associated with CNF 3-0704)	Pre-contact artifact scatter	Not relocated due to high water table (previously determined not eligible)	Unevaluated	Avoid by re-route	Pending
21CA0315	Pre-contact artifact scatter	Eligible (previous determination)	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
21CA0569	Pre-contact artifact scatter	Eligible (previous determination)	Eligible	Avoid by re-route	Pending
21CA0571	Pre-contact artifact scatter	Not eligible (previous determination)	Not eligible	No further work	Pending
21CA0572	Pre-contact artifact scatter	Not eligible (previous determination)	Not eligible	No further work	Pending
21CA0696	Pre-contact artifact scatter	Potentially eligible	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]
21CA0697	Pre-contact lithic scatter, pit feature	Potentially eligible	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]
21CA0698	Historic dump area, prehistoric isolate	Potentially eligible	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]
21CA0699	Historic structural ruin and debris	Potentially eligible	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]
21CE0031	Post-contact farmstead complex	Not eligible	Not eligible	No further work	Pending
21CE0043	Previously identified Pre-contact isolated artifact	Not eligible	Not eligible	No further work	Pending
21CE0044	Previously identified Post-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21CE0058	Isolated Pre-contact flake	Not eligible (previous determination)	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
21CE0059	Previously identified isolated lithic debitage	Not eligible	Not eligible	No further work	Pending
21CE0060	Previously identified artifact scatter	Eligible	Eligible	Avoid by re-route around site boundary	Pending
21CE0061	Previously identified Post-contact ruin, depressions, and artifacts	Not eligible	Not eligible	No further work	Pending
21CE0068	Isolated Pre-contact flake	Not eligible	Not eligible	No further work	Pending
21CE0069	Isolated Pre-contact biface fragment	Not eligible	Not eligible	No further work	Pending
21CE0070	Isolated Pre-contact projectile point	Not eligible	Not eligible	No further work	Pending
21CE0071	Isolated Pre-contact modified flake	Not eligible	Not eligible	No further work	Pending
21HB0028	Previously identified artifact scatter	Potentially eligible (current Phase II evaluation resulted in finding not eligible)	Not eligible	No further work	Pending
21HB0030	Multi-component artifact scatter	Not eligible (previous determination from earlier survey, not relocated in corridor survey)	Not eligible	No further work	Pending
21HB0064	Historic structural ruin and debris	Potentially eligible	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]
21HB0065	Isolated Pre-contact flake	Not eligible	Not eligible	No further work	Pending
21HB0066	Pre-contact artifact scatter	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
21HB0067	Pre-contact isolated artifact	Not eligible	Not eligible	No further work	Pending
21HB0068	Pre-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21HB0069	Pre-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21HB0070	Pre-contact isolated artifact	Not eligible	Not eligible	No further work	Pending
21IC0109	Post-contact artifact scatter and structural remnant	Not eligible (previously eligible, however portion of site within Project corridor has been destroyed by previous construction)	Not eligible	No further work	Pending
21IC0289	Post-contact artifact scatter	Not eligible (previously surveyed, not relocated)	Not eligible	No further work	Pending
21IC0326	Pre-contact artifact scatter	Not eligible (previous determination)	Not eligible	No further work	Pending
21IC0345	Pre-contact artifact scatter	Potentially eligible	Unevaluated	Phase II testing; pending report submittal to DOS[a]	Not submitted for review; report not submitted to DOS.[b]
21IC0348	Post-contact structural ruin	Not eligible	Not eligible	No further work	Pending
21IC0350	Pre-contact ceramic scatter	Not eligible	Not eligible	No further work	Pending
21IC0351	Pre-contact isolate	Not eligible	Not eligible	No further work	Pending
21ICaa	Post-contact site??	Not eligible (previous determination)	Not eligible	No further work	Pending
21ICz	Pre-contact site??	Not eligible (previous determination)	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
21KT0024	Previously identified Pre-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21MA0038	Previously identified Pre-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21MA0039	Previously identified multi-component artifact scatter	Eligible (previous determination)	Eligible	Avoid by HDD	Pending
21MA0040	Previously identified Pre-contact isolated artifact	Not eligible	Not eligible	No further work	Pending
21MA0072	Post-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21MAk	Previously identified Post-contact ghost town	Portion of site within current APE not eligible	Portion of site within current APE not eligible	No further work	Pending
21PE0008	Previously identified Pre-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21PEh	Previously identified Post-contact ghost town	Portion of site within current APE not eligible	Portion of site within current APE not eligible	No further work	Pending
21PL0023	Previously identified Post-contact artifact scatter	Not eligible	Not eligible	No further work	Pending
21RL0008	Pre-contact lithic scatter	Not eligible	Not eligible	No further work	Pending
21SL0874	Post-contact artifact scatter and structural remains	Not eligible (previous determination)	Not eligible	No further work	Pending
USFS 09-03-03-1115	Historic earthen foundation/ dugout	Potentially eligible	Unevaluated	Avoid by re-route	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
BL-BJC-108	House	Not eligible (previous determination)	Not eligible	No further work	Pending
BL-BJC-111	Farmstead	Not eligible	Not eligible	No further work	Pending
BL-BJC-112	Brainerd & Northern Minnesota Railway Co./Northern Pacific Railway	Eligible (previous determination)	Eligible	Avoid by bore/HDD	Pending
BL-BJC-113	Farmstead	Not eligible	Not eligible	No further work	Pending
BL-BJC-114	House	Not eligible	Not eligible	No further work	Pending
BL-BJT-003	House	Not eligible	Not eligible	No further work	Pending
BL-BJT-004	Eastern Railway Company of Minnesota/ Great Northern Railway/ Burlington Northern/ Burlington Northern Santa Fe	Eligible	Eligible	Project activities would not affect resource. No further work	Pending
BL-BJT-005	Minneapolis St. Paul & Sault Ste. Marie Railway/Soo Line Railroad Corridor	Not eligible (previous determination)	Not eligible	No further work	Pending
BL-BJT-006	Brainerd & Northern Minnesota Railway Company/ Northern Pacific/Paul Bunyan State Trail	Eligible (previous determination)	Eligible	Project activities would not affect resource. No further work	Pending
BL-BJT-007	House and garage	Not eligible	Not eligible	No further work	Pending
BL-BJT-008	House and outbuildings	Not eligible	Not eligible	No further work	Pending
BL-BJT-009	House and shed	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
BL-BJT-010	House and garage	Not eligible	Not eligible	No further work	Pending
BL-BJT-011	House and shed	Not eligible	Not eligible	No further work	Pending
BL-BUZ-008	Minneapolis St. Paul & Sault Ste. Marie Railway/Soo Line Railroad Corridor	Potentially eligible	Unevaluated	Phase II evaluation, effects evaluation or avoid	Pending
BL-LAM-001	Minneapolis St. Paul & Sault Ste. Marie Railway/Soo Line Railroad Corridor	Potentially eligible	Eligible	Project activities would not affect resource. No further work	Pending
BL-GVT-004	Eastern Railway Company of Minnesota/ Great Northern/ Burlington Northern/ Burlington Northern Santa Fe	Eligible (previous determination)	Eligible	Pending effects evaluation	Pending
BL-WLC-004	House	Not eligible	Not eligible	No further work	Pending
BL-WLC-005	Eastern Railway Company of Minnesota/Great Northern/ Burlington Northern/ Burlington Northern Santa Fe	Eligible (previous determination)	Eligible	Pending effects evaluation	Pending
BL-WLC-006	House and garage	Not eligible	Not eligible	No further work	Pending
BL-WLC-007	House and garage	Not eligible	Not eligible	No further work	Pending
BL-WLC-008	House and garage	Not eligible	Not eligible	No further work	Pending
BL-WLC-009	Wilton & Northern Railway Corridor	Potentially eligible	Eligible	Avoid by bore/HDD	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
CA-CLC-017	Cass Lake Times Building	Eligible (Phase II evaluation)	Eligible	Project activities would not affect resource. No further work	Pending
CA-CLC-028	Eastern Railway Company of Minnesota/Great Northern Railway/ Burlington Northern/ Burlington Santa Fe	Eligible (Phase II evaluation)	Eligible	Avoid by bore/HDD	Pending
CA-CLC-029	Coal shed	Not eligible (Phase II evaluation)	Not eligible	No further work	Pending
CA-CLC-030	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-031	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-032	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-033	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-034	Commercial building	Not eligible	Not eligible	No further work	Pending
CA-CLC-035	Commercial building	Not eligible	Not eligible	No further work	Pending
CA-CLC-036	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-037	Garage	Not eligible	Not eligible	No further work	Pending
CA-CLC-038	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-039	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-040	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-041	House	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
CA-CLC-042	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-043	Fuel distributor	Not eligible (Phase II evaluation)	Not eligible	No further work	Pending
CA-CLC-044	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-045	House	Not eligible	Not eligible	No further work	Pending
CA-CLC-046	House	Not eligible	Not eligible	No further work	Pending
CA-PKB-022	Eastern Railway Co. of MN/Great Northern Railway/ Burlington Northern/ Burlington Santa Fe	Eligible (Phase II evaluation)	Eligible	Avoid by bore/HDD	Pending
CA-UOG-018	Eastern Railway Co. of Minnesota/Great Northern Railway/ Burlington Northern/ Burlington Santa Fe	Eligible (Phase II evaluation)	Eligible	Avoid by bore/HDD	Pending
CA-UOG-019	Minneapolis, St. Paul & Sault Ste. Marie Railway/Soo Line Railway/Soo Line ATV Trail	Not eligible (Phase II evaluation)	Not eligible	No further work	Pending
CE-DUD-005	House and outbuilding	Not eligible	Not eligible	No further work	Pending
CE-DUD-006	Farmstead	Not eligible	Not eligible	No further work	Pending
CE-DUD-007	Farmstead	Not eligible	Not eligible	No further work	Pending
CE-DUD-008	Minneapolis St. Paul & Sault Ste. Marie Railway/Soo Line Railroad Corridor	Potentially eligible	Eligible	Project activities would not affect resource. No further work	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
CE-HOL-004	Farmstead	Not eligible	Not eligible	No further work	Pending
CE-PLK-002	Christine Holte Farmstead	Not eligible	Not eligible	No further work	Pending
CL-PLK-004	House	Not eligible	Not eligible	No further work	Pending
CL-BLH-009	Farmstead	Not eligible	Not eligible	No further work	Pending
CL-BLH-010	Farmstead	Not eligible	Not eligible	No further work	Pending
CL-BLH-011	House	Not eligible	Not eligible	No further work	Pending
CL-BLH-012	House	Not eligible	Not eligible	No further work	Pending
CL-CQC-119	House	Not eligible	Not eligible	No further work	Pending
CL-SAW-001	Sawyer Public School	Potentially eligible	Eligible	Project activities would not affect resource. No further work	Pending
CL-TLK-006	Lake Superior & Mississippi Railroad/ Northern Pacific/ Willard Munger State Trail	Eligible (previous determination)	Eligible	Project activities would not affect resource. No further work	Pending
CL-TLK-007	House	Not eligible	Not eligible	No further work	Pending
CL-TLK-008	House	Not eligible	Not eligible	No further work	Pending
CL-TLK-009	Northern Pacific Railway	Potentially eligible	Eligible	Avoid by bore/HDD	Pending
CL-TLK-010	House and garage	Not eligible	Not eligible	No further work	Pending
CL-TLK-011	Farmstead	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
CL-UOG-003	Northern Pacific Railway	Eligible (previous determination)	Eligible	Project activities would not affect resource. No further work	Pending
CL-UOG-005	House and outbuildings	Not eligible	Not eligible	No further work	Pending
CL-UOG-006	Farmstead	Not eligible	Not eligible	No further work	Pending
HB-FAR-002	Gravel pit	Not eligible	Not eligible	No further work	Pending
HB-FAR-003	Eastern Railway Company of Minnesota/Great Northern/ Burlington Northern/ Burlington Northern Santa Fe	Eligible (previous determination)	Eligible	Project activities would not affect resource. No further work	Pending
HB-HEL-003	Farmstead	Not eligible	Not eligible	No further work	Pending
HB-HEL-004	House and outbuildings	Not eligible	Not eligible	No further work	Pending
HB-HEL-005	House	Not eligible	Not eligible	No further work	Pending
HB-HEL-006	House and outbuildings	Not eligible	Not eligible	No further work	Pending
HB-HEL-007	House	Not eligible	Not eligible	No further work	Pending
HB-HEL-008	House	Not eligible	Not eligible	No further work	Pending
HB-HEL-009	Stone building	Potentially eligible	Eligible	Project activities would not affect resource. No further work	Pending
HB-HEL-010	House	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Eligibility Determination by DOS	Action Required by Enbridge	Minnesota SHPO or THPO Concurrence with DOS Finding
HB-HEL-011	Farmstead	Not eligible	Not eligible	No further work	Pending
IC-BLK-004	House and outbuildings	Not eligible	Not eligible	No further work	Pending
IC-BLK-005	Eastern Railway Company of Minnesota/Great Northern/ Burlington Northern/ Burlington Northern Santa Fe	Eligible (previous determination)	Eligible	Project activities would not affect resource. No further work	Pending
IC-BLK-006	House and outbuildings	Not eligible	Not eligible	No further work	Pending
IC-BLK-007	House and outbuildings	Not eligible	Not eligible	No further work	Pending
IC-CHC-007	Railroad grade	Not eligible	Not eligible	Phase II work completed	Pending
IC-CHC-008	House and outbuildings	Not eligible	Not eligible	No further work	Pending
IC-DRT-004	Farmstead	Eligible	Eligible	Project activities would not affect resource. No further work	Pending
IC-DRT-006	Duluth & Winnipeg Railroad/ Great Northern Railway	Eligible (previous determination)	Eligible	Avoid by bore/HDD	Pending
IC-DRT-008	House	Not eligible	Not eligible	No further work	Pending
IC-DRT-009	House	Not eligible	Not eligible	No further work	Pending
IC-GRC-085	Great Northern Railway/ Burlington Northern Santa Fe Railway	Eligible (previous determination)	Eligible	Avoid by bore/HDD	Pending
IC-GRT-025	House and garage	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
IC-MOR-005	Farmstead	Not eligible	Not eligible	No further work	Pending
IC-MOR-006	House	Not eligible	Not eligible	No further work	Pending
IC-MOR-007	Farmstead	Not eligible	Not eligible	No further work	Pending
IC-UOG-089	Farmstead	Not eligible	Not eligible	No further work	Pending
IC-ZMC-002	House and garage	Not eligible	Not eligible	No further work	Pending
IC-ZMC-003	House and outbuildings	Not eligible	Not eligible	No further work	Pending
IC-ZMC-004	House and garage	Not eligible	Not eligible	No further work	Pending
IC-ZMC-005	Garage	Not eligible	Not eligible	No further work	Pending
IC-ZMC-006	House and garage	Not eligible	Not eligible	No further work	Pending
KT-CHS-004	Farmstead	Not eligible	Not eligible	No further work	Pending
KT-DAV-001	St. Paul & Pacific Railroad (St. Vincent Extension)/Great Northern Railway	Eligible (previous determination)	Eligible	Avoid by bore/HDD	Pending
KT-DAV-002	Granary	Not eligible (Phase II evaluation completed)	Eligible	Use yard entrance located at SE corner of yard	Pending
KT-SKT-004	Grain elevator	Not eligible	Not eligible	No further work	Pending
KT-SKT-005	Potato warehouse complex	Not eligible	Not eligible	No further work	Pending
KT-SKT-006	Railroad	Eligible	Eligible	Avoid by bore/HDD	Pending
KT-SKT-007	Railroad trestle	Eligible	Eligible	Avoid by bore/HDD	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
KT-SKT-008	Granary	Not eligible (Phase II evaluation completed)	Eligible	Use yard entrance located at SE corner of yard	Pending
KT-SVA-003	Farmstead	Not eligible	Not eligible	No further work	Pending
KT-TGT-001	Silo and grain bins	Not eligible	Not eligible	No further work	Pending
MA-CMS-001	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-SNT-001	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-SNT-002	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-VKC-006	Grain bins/ quonset shed	Not eligible	Not eligible	No further work	Pending
MA-VKC-007	Railroad	Eligible	Eligible	Avoid by bore/HDD	Pending
MA-VKC-008	Commercial building	Not eligible	Not eligible	No further work	Pending
MA-VKC-009	House	Not eligible	Not eligible	No further work	Pending
MA-VKC-010	House and garage	Not eligible	Not eligible	No further work	Pending
MA-VKC-011	Garage	Not eligible	Not eligible	No further work	Pending
MA-VKC-012	House	Not eligible	Not eligible	No further work	Pending
MA-VKC-013	Garage	Not eligible	Not eligible	No further work	Pending
MA-VKC-014	House	Not eligible	Not eligible	No further work	Pending
MA-VKC-15	Pump house	Not eligible	Not eligible	No further work	Pending
MA-VKC-16	House	Not eligible	Not eligible	No further work	Pending
MA-VKC-17	House	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
MA-VKC-18	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-VKC-19	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-VKT-002	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-VKT-003	Railroad	Eligible	Eligible	Avoid by bore/HDD	Pending
MA-WAG-002	Farmstead	Not eligible	Not eligible	No further work	Pending
MA-WAG-003	Farmstead	Not eligible	Not eligible	No further work	Pending
PE-ROC-001	Railroad	Eligible	Eligible	Avoid by bore/HDD	Pending
PL-CHS-003	Farmstead	Not eligible	Not eligible	No further work	Pending
PL-CHS-004	Farmstead	Not eligible	Not eligible	No further work	Pending
PL-GLT-002	Log house	Potentially eligible	Unevaluated	Avoid (no longer in Project area, access road will not be used)	Pending
PL-GLT-004	Minneapolis, St. Paul & Sault Ste. Marie Railway/Soo Line Railway	Eligible	Eligible	Avoid by bore/HDD	Pending
PL-TRC-006	Wayside Park	Not eligible	Not eligible	No further work	Pending
PL-TRC-007	Hotel	Not eligible	Not eligible	No further work	Pending
PL-TRC-008	House and garage	Not eligible	Not eligible	No further work	Pending
PL-TRC-009	House and garage	Not eligible	Not eligible	No further work	Pending
PL-TRC-010	House, garage, and two outbuildings	Not eligible	Not eligible	No further work	Pending
PL-TRC-011	Machinery shed	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued) Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Eligibility Determination by DOS**	**Action Required by Enbridge**	**Minnesota SHPO or THPO Concurrence with DOS Finding**
PL-TRC-012	Granary	Not eligible	Not eligible	No further work	Pending
PL-TRC-013	House	Not eligible	Not eligible	No further work	Pending
PL-TRC-014	House and shed	Not eligible	Not eligible	No further work	Pending
PL-TRC-015	Shed	Not eligible	Not eligible	No further work	Pending
PL-TRC-016	Railroad	Eligible	Eligible	Avoid by bore/HDD	Pending
PL-TRC-017	House	Not eligible	Not eligible	No further work	Pending
PL-TRC-018	House	Not eligible	Not eligible	No further work	Pending
PL-TRC-019	House	Not eligible	Not eligible	No further work	Pending
RL-OKC-006	Farmstead	Not eligible	Not eligible	No further work	Pending
RL-PVC-016	Railroad	Eligible	Eligible	Avoid by bore/HDD	Pending
SL-ARH-002	House and outbuildings	Not eligible	Not eligible	No further work	Pending
SL-FLT-002	Log structure	Not eligible	Not eligible	No further work	Pending
SL-FLT-003	Farmstead	Not eligible	Not eligible	No further work	Pending
SL-FLT-004	Farmstead	Not eligible	Not eligible	No further work	Pending
SL-UOG-086	Duluth & Winnipeg Railroad/ Great Northern Railway	Eligible (previous determination)	Eligible	Avoid by bore/HDD	Pending
SL-UOG-087	Crop storage building	Not eligible	Not eligible	No further work	Pending
SL-UOG-088	House and outbuildings	Not eligible	Not eligible	No further work	Pending
SL-UOG-089	Farmstead	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-2 (continued)
Historical and Archaeological Resources Identified in Minnesota for the Alberta Clipper Project

HDD = Horizontal directional drill; NRHP = National Register of Historic Places; PCY = Potential contractor yard.

[a] Anticipated actions by Enbridge for these resources will be determined by DOS and in consultation with consulting parties and tribes upon receipt of the respective draft reports.

[b] Draft reports, once received, will be reviewed by DOS, and DOS will submit the reports and findings to the applicable Tribal Historic Preservation Officer (THPO), tribal representative, and/or State Historic Preservation Officer (SHPO).

Historic property identification and evaluation efforts are incomplete. Draft reports have been completed for the southern section of the pipeline south of Clearbrook and the proposed corridor around the FDL Reservation. A letter report has also been prepared for the Project corridor that traverses the FDL Reservation. All of these reports have been submitted to DOS for review and have been forwarded to the Minnesota SHPO for concurrence. DOS sent letters to the Minnesota SHPO requesting concurrence for DOS determinations of eligibility and effect on December 8, 2008 and January 12, 2009. No response has been received from the Minnesota SHPO and concurrence is assumed per 36 CFR 800.3(c)(4) as the review period has extended beyond 30 days. The LLBO THPO concurred with DOS findings of eligibility and effect on September 5, 2008. A draft report for a Phase II survey of sites on the LLR is forthcoming. Any additional cultural resource survey work conducted on the Project once the EIS is finalized would be completed under the stipulations of the PA. The Draft Final PA is included in Appendix R.

4.11.2.3 Wisconsin

For the Phase I archaeological investigation, the 106 Group conducted a pedestrian survey of 689.35 acres and pedestrian survey and shovel testing for 60.85 acres. The survey included excavation of 609 shovel probes in six areas that were assessed as warranting subsurface investigation.

No previously unrecorded archaeological sites were identified by the 106 Group during the Phase I archaeological investigations. One previously recorded site (47DG0116) was identified within the proposed Project corridor. Literature reviews, historical research, and an intensive archaeological survey that resulted in no archaeological materials at site 47DG0116 provided inconclusive evidence concerning the date of the structure other than it probably dates from the 19th or early 20th centuries. Based on the results of the intensive survey and literature review, as well as the highly disturbed condition of the site area and the highly dilapidated state of the feature, the 106 Group recommends that site 47DG0116 is not eligible for listing in the NRHP. No further work was recommended prior to construction.

The architectural survey of the proposed Project corridor identified four architectural properties 45 years of age or older. All of the architectural properties are segments of railroad lines. DOS has determined that all of the railroad lines are not eligible for listing in the NRHP. All of the railroads would be avoided by HDD/boring underneath the railroads. DOS has made recommendations on NRHP eligibility and Project effects, and has submitted these findings for review by consulting parties (see Table 4.11.2-3).

TABLE 4.11.2-3
Historical and Archaeological Resources Identified in Wisconsin for the Alberta Clipper Project

Site #	Description	NRHP Eligibility Recommendation from Enbridge	NRHP Determination by DOS	Action Required by Enbridge	Wisconsin SHPO Concurrence with DOS Finding
47DG0116	Historic period sandstone structure	Not eligible	Not eligible	No further work	Concur
No Site #	Duluth, Missabe & Iron Range/ Canadian National Railway	Not eligible	Not eligible	Avoid by bore/HDD	Concur
No Site #	Eastern Railway Co. of Minnesota/ Burlington Northern Santa Fe	Not eligible	Not eligible	Avoid by bore/HDD	Concur
No Site #	Minneapolis St. Paul & Sault Ste. Marie Railway/ Soo Line/Canadian Pacific Railway	Not eligible	Not eligible	Avoid by bore/HDD	Concur
No Site #	Wisconsin Central/Soo Line/Canadian Pacific Railway	Potentially eligible	Not eligible	Avoid by bore/HDD	Concur
Field # 1	House	Not eligible	Not eligible	No further work	Pending
Field # 2	Farmstead	Not eligible	Not eligible	No further work	Pending
Field # 1	Nemadji Cemetery	Potentially eligible	Unevaluated	Phase II architectural history survey	Pending
Field # 2	St. Francis Cemetery	Potentially eligible	Unevaluated	Phase II architectural history survey	Pending
Field # 3	Point Douglas-Superior Military Road	Potentially eligible	Unevaluated	Phase II architectural history survey	Pending
Field # 4	Superior Terminal	Potentially eligible	Unevaluated	Phase II architectural history survey	Pending
Field # 5	Chicago St. Paul Minneapolis & Omaha Railroad/ Chicago & North Western Railway	Potentially eligible	Unevaluated	Phase II architectural history survey	Pending
Field # 17	Northern Pacific Railway/Burlington Northern Railway/ Burlington Northern Santa Fe Railway	Potentially eligible	Unevaluated	Phase II architectural history survey	Pending
Field # 6	House and outbuildings	Not eligible	Not eligible	No further work	Pending

TABLE 4.11.2-3 (continued) Historical and Archaeological Resources Identified in Wisconsin for the Alberta Clipper Project					
Site #	**Description**	**NRHP Eligibility Recommendation from Enbridge**	**NRHP Determination by DOS**	**Action Required by Enbridge**	**Wisconsin SHPO Concurrence with DOS Finding**
Field # 7	House and outbuildings	Not eligible	Not eligible	No further work	Pending
Field # 8	House and outbuildings	Not eligible	Not eligible	No further work	Pending
Field # 9	House and outbuildings	Not eligible	Not eligible	No further work	Pending
Field # 10	House and garage	Not eligible	Not eligible	No further work	Pending
Field # 11	House and outbuildings	Not eligible	Not eligible	No further work	Pending
Field # 12	House and garage	Not eligible	Not eligible	No further work	Pending
Field # 13	House and outbuildings	Not eligible	Not eligible	No further work	Pending
Field # 14	House and garage	Not eligible	Not eligible	No further work	Pending
Field # 15	House and garages	Not eligible	Not eligible	No further work	Pending
Field # 16	House and garage	Not eligible	Not eligible	No further work	Pending

HDD = Horizontal directional drill.
NRHP = National Register of Historic Places.
SHPO = State Historic Preservation Officer.

A cultural resource survey (Addendum I Report) for Project re-routes, route revisions, gap analysis, and extra workspaces has been completed. DOS reviewed the Addendum I Report and determined that no additional historic properties were identified in these areas. DOS has made determinations on NRHP eligibility and Project effects, and has submitted these findings for review to the Minnesota SHPO. We sent letters requesting concurrence of our determinations and effect on November 18, 2008 and January 23, 2009. We received an initial letter of concurrence from the Wisconsin SHPO on December 16, 2008. DOS submitted the followup letter clarifying its determinations of eligibility on January 12, 2009. No response was received from the Wisconsin SHPO concerning the DOS letter of January 23, 2009.

Addendum II and Superior Terminal survey reports identified 17 additional architectural properties 45 years of age or older. These properties included two railroads, the Superior Terminal, two cemeteries, the Point Douglas-Superior Military Road, a farmstead, and 12 houses with associated buildings. Six of the properties, including the two cemeteries, two railroads, military road, and terminal, were recommended as potentially eligible for listing in the NRHP by the 106 Group, but are currently considered unevaluated by the DOS pending submission of a Phase II evaluation of the potentially eligible properties that is forthcoming. The 11 remaining architectural properties have been determined not eligible for listing in the NRHP by DOS. Any additional cultural resource survey work conducted on the Project once the EIS is finalized would be completed under the stipulations of the PA. The Draft Final PA is included in Appendix R.

4.11.3 Consultation

4.11.3.1 Introduction

Under Section 106 of the NHPA, the lead federal agency is required to share Project information and consult with consulting parties as identified in 36 CFR 800.3. This includes Indian tribes, SHPOs, local governments, and applicants for federal permits. For this Project, DOS consulted with each SHPO, the LLBO THPO, and FDL's Cultural Resource Contact, 45 Indian tribes, numerous federal and state agencies and local governments, and members of the public. The level of consultation DOS performed with each party was commensurate with the interest and concern that was displayed. Government-to-government consultation meetings, direct mailings, teleconferencing, direct telephone communications, fax, and email were all used to keep consulting party members informed and to solicit comments on the Project. Seven Section 106 consultation meetings (both individual and group meetings) were conducted between 2007 and 2009 with numerous Indian tribes and other consulting parties.

Informal discussions with SHPOs and Indian tribes were initiated by Enbridge and their consultants in 2006. These initial communications by Enbridge followed protocols used by FERC to conduct tribal and agency consultations early in the planning process of the pipeline Project. The FERC guidelines generally require the applicant to inform these groups of the Project application and to seek their comments. In an effort to appropriately observe the government-to-government relationship of the federal government with Indian tribes, DOS asserted its lead federal agency status under Section 106 and its responsibilities to consult directly with the Indian tribes, SHPOs, and agencies on October 16, 2007, when DOS initiated Section 106 consultation for the proposed Project. The communications that have occurred between DOS and Indian tribes are shown in Appendix R.

4.11.3.2 Federal and State Agency Consultation

In an effort to coordinate compliance with NEPA and Section 106, DOS consulted with federal agencies whose participation in the Project was considered an undertaking as per 36 CFR 800.16(y). The agencies who are official consulting parties and have delegated their 106 responsibilities to DOA are the COE, Forest Service, NRCS, and BIA. EPA will be participating in the NHPA Section 106 process as time and resources allow. The ACHP has also been participating with DOS in the review of the draft PA by providing comments and suggestions and by participating in tribal consultation meetings. Through a series of teleconferences and meetings with these agencies, DOS has identified the overlapping responsibilities for Section 106 on certain federally owned or managed lands in the Project area. Most notably, the Forest Service reviewed the findings of historic properties investigations on properties that they own or manage on the CNF. DOS met with CNF on May 7, 2008, and with the COE on May 9, 2008, to review the Project and to promote Project reviews and coordination. The COE and CNF also attended several of the group tribal consultation meetings. Monthly interagency teleconferences were also held.

In addition, the CNF has coordinated with Enbridge in the preparation of an environmental review of potential adverse effects specific to CNF lands and the LLR (Appendix U). This appendix includes an analysis of identified and evaluated historic properties, as well as potential adverse effects to heritage resources (Section 3.4 in Appendix U). The analysis on historic properties is incorporated within Section 4.11.2 of the Appendix U. In addition to historic properties, Appendix U discusses previous consultation with LLBO in 2001 in regard to the Terrace III Project Cass Lake Loop and its potential to affect traditional resource harvesting areas. While LLBO has noted that these areas may not be eligible for listing in the NRHP, LLBO recommended several measures to minimize the loss of resources. These measures included identifying the construction area, providing time for LLBO to notify affected communities, allowing community members to harvest non-saleable timber (for firewood) and other

traditional resources prior to clearing or surface disturbance, and replanting disturbed areas with native plant species that are beneficial to wildlife and with those native plants that are used by the Anishinabe people for traditional purposes.

DOS also has consulted with several state agencies, including the three SHPOs in the Project area: North Dakota SHPO, Minnesota SHPO, and Wisconsin SHPO. DOS has consulted with each SHPO in order to develop appropriate research and field survey methods to adequately identify and evaluate historic properties, the APE, NRHP eligibility of historic properties, Project effects, and development of a PA. The Draft Final PA is included in Appendix R.

Each SHPO has been actively consulted concerning filing of the various Unanticipated Discovery Plans for each state. Unanticipated Discovery Plans have been prepared for North Dakota, Minnesota, and Wisconsin and are included as attachments to the PA that appears in Appendix R.

4.11.3.3 Indian Tribal Consultation

The list of Indian tribes that were notified for this Project was derived from lists maintained by the COE, SHPOs, state tribal liaisons, THPOs, BIA, and recommendations from other tribes. In compliance with 36 CFR 800.2 and confidentiality requirements, DOS provided consulting Indian tribes with information pertaining to any findings or determinations that were derived from historic properties reports prepared for portions of the Project's APE. Indian tribes initially were invited to consult regarding the proposed Project on May 25, 2007, by the COE. DOS subsequently notified the consulting parties that it would be the lead federal agency for the Project and invited parties to consultation on October 16, 2007. Following these invitations, six tribes (Keweenaw Bay Indian Community, Lac Vieux Desert Band of Lake Superior Chippewa, Sac and Fox Tribe of the Mississippi in Iowa, Oneida Nation of Wisconsin, Shakopee Mdewakanton Sioux and the Stockbridge Munsee Community) have notified either the COE or DOS that they have no objection to the proposed Project. Twenty-three Indian tribes did not respond to requests for consultation. Consultation with LLBO, FDL, Bois Forte Band of Chippewa, Flandreau Santee Sioux Tribe, Forest County Potawatomi, Fort Peck Tribe, Ho-Chunk Nation, Lower Sioux Indian Community, Mille Lacs Band of Ojibwe, Red Lake Band of Chippewa, Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin, Sisseton-Wahpeton Oyate Sioux Tribe, Spirit Lake Tribe, Standing Rock Sioux Tribe, Upper Sioux Community, and White Earth Band of Ojibwe has been ongoing since the invitations to consultation were distributed on May 25, 2007, and on October 16, 2007. The consulting tribes are listed in Table 4.11.3-1, and the list of consultation meetings is included in Table 4.11.3-2. A summary of the tribal consultation efforts is included in Appendix R. Section 106 consultation will continue under the PA. The Draft Final PA is provided in Appendix R.

The proposed Project bisects two Indian reservations: the LLR and the FDL Reservation. LLBO have on staff a THPO who, under Section 101(d)(2) of the NHPA, assumes the responsibilities of the SHPO for Section 106 on tribal lands. To date, DOS has consulted directly with LLBO on cultural resource assessments conducted on the LLR and the CNF. The Heritage Sites Program of LLBO authored the cultural resource report conducted on the reservation. DOS met with the LLBO THPO at the LLR on May 8, 2008, and has provided the tribe with all cultural resource reports that have been prepared for the proposed Project to date. DOS requested and obtained concurrence from the LLBO THPO on all determinations of eligibility and Project effects. In addition to LLBO, DOS has requested comments or expressions of interest from the Local Indian Councils of LLBO. No expressions of interest or comments about the Project from the councils have been received to date. Additional consultation with LLBO will be conducted to address potential Project adverse effects to traditionally used sweet vernal grass, sweet fern, and Canada yew—all species identified by LLBO as traditionally used plants. LLBO have recommended direct consultation with the LLBO THPO to address potential adverse effects to sweet

vernal grass. On a previous unrelated Project, LLBO requested that adverse effects to traditional harvesting areas be minimized through a series of measures (see Section 4.11.3.2).

TABLE 4-11.3-1
Tribes Consulted under Section 106 for the Alberta Clipper Project

		Status
1	Bois Forte Band of Chippewa	Expressed Interest/Currently Consulting
2	Flandreau Santee Sioux Tribe of South Dakota	Expressed Interest/Currently Consulting
3	FDL Band of Superior Chippewa	Expressed Interest/Currently Consulting
4	Forest County Potawatomi	Expressed Interest/Currently Consulting
5	Fort Peck Tribe	Expressed Interest/Currently Consulting
6	Ho-Chunk Nation	Expressed Interest/Currently Consulting
7	Leech Lake Band of Ojibwe	Expressed Interest/Currently Consulting
8	Lower Sioux Indian Community	Expressed Interest/Currently Consulting
9	Mille Lacs Band of Ojibwe	Expressed Interest/Currently Consulting
10	Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin	Expressed Interest/Currently Consulting
11	Red Lake Band of Chippewa Indians	Expressed Interest/Currently Consulting
12	Sisseton-Wahpeton Oyate Sioux Tribe	Expressed Interest/Currently Consulting
13	Spirit Lake Tribe	Expressed Interest/Currently Consulting
14	Standing Rock Sioux Tribe	Expressed Interest/Currently Consulting
15	Upper Sioux Community	Expressed Interest/Currently Consulting
16	White Earth Band of Ojibwe	Expressed Interest/Currently Consulting
17	Bad River Band of the Lake Superior Chippewa	No Response
18	Blackfeet Nation	No Response
19	Cheyenne River Sioux	No Response
20	Crow Creek Sioux	No Response
21	Crow Tribe	No Response
22	FDL of the Minnesota Chippewa	No Response
23	Fort Belknap Indian Community	No Response
24	Grand Portage Band of the Minnesota Chippewa	No Response
25	Keweenaw Bay Indian Community	No Objection
26	Lac Courte Oreilles Band of Lake Superior Chippewa of Wisconsin	No Response
27	Lac du Flambeau of Lake Superior Chippewa	No Response
28	Lac Vieux Desert Band of Lake Superior Chippewa	No Objection
29	Leech Lake Band of Minnesota Chippewa	No Response
30	Menominee Indian Tribe of Wisconsin	No Response
31	MHA Nation	No Response
32	Minnesota Chippewa Tribe	No Response
33	Oglala Sioux Tribe	No Response

TABLE 4.11.3-1 (continued) Tribes Consulted under Section 106 for the Alberta Clipper Project		
		Status
34	Oneida Nation of Wisconsin	No Objection
35	Prairie Island Indian Community	No Response
36	Rosebud Sioux Tribe	No Response
37	Sac and Fox Nation	No Response
38	Sac and Fox Tribe of the Mississippi in Iowa	No Objection
39	Sac and Fox Nation of Missouri in Kansas and Nebraska	No Response
40	Santee Sioux Nation	No Response
41	Shakopee Mdewakant on Sioux Community	No Objection
42	Sokaogon Chippewa Community	No Response
43	St. Croix Chippewa Indians of Wisconsin	No Response
44	Stockbridge – Munsee Community	No Objection
45	Turtle Mountain Band of Chippewa Indians	No Response
46	Yankton Sioux	No Response

In addition to LLBO, several Indian tribes requested consultation, consistent with 36 CFR 800.2(c)(2)(ii), due to the Project's potential to affect tribal historic properties that are situated on ancestral lands. In a letter dated September 24, 2007, FDL expressed concerns about sacred sites and wild rice in areas that lie close to or within the proposed Project's APE, more specifically, the area around the reservation associated with the current FDL Alternative route. The Project corridor has been changed to a route through the FDL Reservation; these resources do not appear affected by the currently proposed Project, as the wild rice areas are now upstream from the Project route. On May 7, 2008, DOS met with FDL tribal members to discuss the Project. To take into account FDL concerns about sacred sites and TCPs in the APE, Enbridge and DOS are currently working with FDL to identify areas of concern within the Project corridor. FDL identified two potential TCPs within the APE, but associated with the current FDL Alternative route. The currently proposed route through the FDL Reservation would not affect these two potential TCPs (Ketz and Betker 2008, Dupuis 2008). LLBO, FDL, and the Mille Lacs Band of Ojibwe have agreed to prepare a TCP study of the pipeline corridor. Completion of the studies is expected by May 2009.

In addition to the consultation noted above, the DOS conducted seven (both group and individual) Section 106 consultation meetings with Indian tribes and other consulting parties between August 2007 and April 2009. Over the course of these meetings, information concerning the Project was shared and results of survey work were presented. Tribes expressed concerns about the Project's effects on the environment and cultural resources (including TCPs), tribal participation in the identification of historic properties, and tribal roles in development of the PA. These meetings resulted in three tribes agreeing to prepare TCP studies; the hiring of tribal participants for archaeological survey work beginning in May 2009; site visits along the pipeline corridor by tribal elders, tribal cultural resource specialists, and/or THPOs; and utilization of tribal monitors along appropriate locations along the Project corridor. All of these efforts will help to further avoid and/or minimize Project effects to historic properties. Transcripts for all of the meetings were prepared and were distributed to the consulting parties.

TABLE 4.11.3-2 List of DOS Group Consultation Meetings with Indian Tribes for the Alberta Clipper Project			
Date	**Place**	**Indian Tribes Present**	**Agencies Represented**
August 17, 2007	St. Paul, MN	Fond du Lac Band of Lake Superior Chippewa (FDL)	U.S. Department of State (DOS), U.S. Army Corps of Engineers (COE)
May 7, 2008	FDL Reservation, MN	FDL	DOS, COE
May 8, 2008	Leech Lake Reservation, MN	Leech Lake Band of Ojibwe Indians (LLBO)	DOS, COE
September 10, 2008	Detroit Lakes, MN	White Earth Band of Ojibwe, LLBO, Mille Lacs Band, Fort Peck Tribe, and Lower Sioux Tribe	DOS, COE, and U.S. Forest Service (Forest Service)
December 9, 2008	Clubhouse Hotel, Detroit Lakes, MN	FDL, White Earth Band of Ojibwe, LLBO, Mille Lacs Band of Ojibwe, Fort Peck Tribe, Lower Sioux Indian Community, Wahpekute Band of Dakotah	DOS, COE, and Forest Service
January 21–22, 2009	Northern Lights Casino, Walker, MN (Leech Lake Reservation)	LLBO, FDL, Mille Lacs Band of Ojibwe, White Earth Band of Ojibwe, Lower Sioux Indian Community, Fort Peck	DOS, Forest Service
April 1–3, 2009	Onomia, MN (Mille Lacs Reservation)	Mille Lacs Band of Ojibwe, FDL, LLBO, Lower Sioux Indian Community, Fort Peck	DOS, COE, Forest Service, and Bureau of Indian Affairs

Note: Enbridge pipeline representatives and their cultural resource consultants (LLBO Heritage Sites Program and the 106 Group attended the April 1–3, 2009 group meeting.

4.11.3.4 Identification of Traditionally Used Plants and Animals

Several consulting Indian tribes consider natural resources located within the Project area to be cultural resources that are significant to their respective tribes. LLBO and FDL have identified several traditionally used plants and animals. A biological study (Natural Resource Group 2008a) was prepared that assesses the presence of traditional used plants in the Project corridor within the FDL Reservation. Prior to the completion of these studies, in meetings with Enbridge technical personnel, the FDL identified Northern white cedar, paper birch, sweetgrass, wild rice, and blueberry as traditionally used species. Using this information, Enbridge conducted surveys of plants of tribal interest and found Northern white cedar, paper birch, and blueberry. Sweetgrass was not found along the Project corridor (Natural Resource Group 2008a).

Due to the downstream location of the currently proposed pipeline corridor from the wild rice lakes, construction of the pipeline within the Project corridor through the FDL Reservation is not expected to affect the FDL Reservation wild rice lakes.

In addition, FDL, the Bois Forte Band of Minnesota Chippewa, and the Grand Portage Band of the Minnesota Chippewa retain usufructuary rights related to hunting, fishing, and gathering in the Ceded Territories. These rights are seminal to the continuity of Native American cultures. The proposed Project could temporarily limit these activities during construction; however, it would have no impacts during operation.

Certain animal species are also used for subsistence and traditional purposes by tribes. Hunting for deer and small mammals (such as porcupine and rabbits), as well as fishing, are critical cultural practices. Eagle feather gathering is also important for a number of traditional ceremonies. Maintenance of the animal resources associated with these practices, therefore, is of concern to many tribes.

4.11.4 Public Involvement

Consistent with 36 CFR 800.2(d)(1–3), DOS has followed ACHP guidance in its efforts to involve the public in the Section 106 process through the NEPA process. As stated previously, DOS placed notices in the Federal Register (including the Receipt of Application and Scoping Notices) and provided copies of the application to local communities within the Project APE. Thirteen scoping meetings were held in the vicinity of the pipeline corridor. Twelve public scoping meetings were held in August 2007, and one supplemental public scoping meeting was held on May 8, 2008, in Clearbrook, Minnesota. In addition, eight public comment meetings were held along the general Project route to receive public comments on the DEIS in December 2008 and January 2009. DOS provided direct mailings to stakeholders through mailing lists that included approximately 2,500 individuals and organizations.

4.11.5 Unanticipated Discovery Plans

Unanticipated Discovery Plans for North Dakota, Minnesota, and Wisconsin are contained as attachments to the PA in Appendix R. They were prepared in consultation with the consulting parties for this Project that included the SHPOs of the three states, Indian tribes, as well as federal agencies. As outlined in the PA, Enbridge would implement the plans, with DOS oversight, in the event that unanticipated cultural materials or human remains are encountered during the construction phase of the Project.

4.11.6 Summary

Enbridge and their consultants have completed historic property surveys for approximately 99 percent of the proposed Alberta Clipper Project in North Dakota, Minnesota, and Wisconsin. Additional historic properties inventories for Project access roads, additional temporary workspaces, pipeline re-routes, appurtenant facilities, and previously inaccessible areas would be completed prior to construction. DOS consultation with Indian tribes is ongoing. DOS will address areas of concern to Indian tribes that may contain properties of cultural and religious significance, including TCPs, within the Project APE. Consequently, there will be ongoing review of new data regarding identification of, and Project effects to, historic properties. The process of complying with Section 106 of the NHPA is not complete.

The Draft Final PA, included in Appendix R, satisfies and completes the requirements of 36 CFR 800. The PA ensures that an appropriate process is followed for identification and protection of historic properties (which includes properties of cultural and religious significance, including TCPs, within the Project APE) and that the remaining cultural resource surveys are completed. Excluding properties of cultural and religious significance (and TCPs), the remaining areas of compliance to be conducted by Enbridge in each state are discussed below.

4.11.6.1 North Dakota

No remaining sections of the pipeline corridor in North Dakota need to be surveyed for cultural resources at this time, and no further evaluative testing is planned. In North Dakota, the cultural resource surveys for Project access roads, additional temporary workspace outside of the surveyed corridor, pipeline re-routes, and appurtenant facilities were completed in July 2008. The cultural resource surveys for Project re-routes, route revisions, gap analysis, and extra workspaces have been completed and a management summary pertaining to this work has been forwarded to the DOS; but a draft report has not been completed. DOS will review the draft report upon submittal, under the stipulations of the PA. The Draft Final PA is included in Appendix R.

To date, 26 cultural resources have been identified within the Alberta Clipper Project APE in North Dakota. Of these, 23 have been assessed by DOS as being ineligible for listing in the NRHP and require no further action unless construction activities are projected to fall outside of the surveyed corridor. The remaining three historic properties (32PB0206, 32PB0173, and 32PB0161) have been designated as NRHP-eligible properties. Enbridge has elected to avoid these three unevaluated properties through HDD or boring. DOS has made findings of NRHP eligibility, and the North Dakota SHPO concurred with those findings on February 28, 2008 and on January 22, 2009.

4.11.6.2 Minnesota

During the Phase I survey for the Alberta Clipper Pipeline Project, the 106 Group identified 28 previously unrecorded archaeological sites in Minnesota. Based on Phase I investigations, sites 21BL0283 and 21BL0284 were considered unevaluated for listing in the NRHP by DOS. Both of these sites will be avoided by HDD or boring. Twenty-seven previously recorded sites were identified by the 106 Group and the LLBO Heritage Sites Program. Of the previously recorded sites, only three sites (21MA0039, 21CA0569, and 21CE0060) were recommended as eligible for listing in the NRHP. Avoidance by HDD was recommended for site 21CE0039. Sites 21CA0569 and 21CE0060 would be avoided by a re-route. Fourteen archaeological resources (21BL0283, 21BL0284, 21CA0169, 21CA0315, 21CA0696, 21CA0697, 21CA0698, 21CA0699, 21HB0030, 21HB0064, 21IC0345, 21IC0350, 21IC0351, and 21RL0008) were determined by DOS to be unevaluated. These sites would either be avoided by bore/HDD or re-route, or subjected to Phase II testing.

On the LLR/CNF, LLBO identified seven sites as being potentially eligible for listing in the NRHP and recommended either avoidance or NRHP eligibility testing. These sites include 21HB0064, 21CA0699, 21CA698, 21CA0697, 21CA0696, CNF-903031115, and 21IC0345. Since the submittal of the report, Enbridge has committed to avoiding sites 21CA169, 21CA569, and CNF-903031115. Due to route adjustments, Enbridge would conduct NRHP testing of site 21CA315.

The 106 Group identified 162 historic resources 45 years of age or older within the APE of the pipeline corridor and the contractor yards. Twenty-nine of these properties are railroads or railroad-related structures or corridors. Ten of these railroads had been previously determined to be eligible, and 15 were recommended as eligible for listing. One of the railroads (BL-BUZ-008) was determined to be unevaluated by DOS. A railroad grade (IC-CHC-007), a railroad trestle (KT-SKT-007), and a railway corridor (BL-WLC-009) were evaluated as eligible for listing in the NRHP. Five buildings were evaluated as eligible for listing in the NRHP. This included a stone building (HB-HEL-009), the Sawyer Public School (CL-SAW-001), the Cass Lake Times Building (CA-CLC-017), and two granaries (KT-DAV-002 and KT-SKT-008). All of the eligible railroads and buildings would be avoided by boring or HDD, or were determined not to be adversely affected by Project activities. Three other historical resources (09-03-03-1115, IC-DRT-004, and PL-GLT-002) were determined by DOS to be unevaluated. For all unevaluated properties, Project plans have either been altered to avoid these properties or DOS is

awaiting Phase II evaluations. The remaining 125 historical resources were recommended as not eligible for listing in the NRHP.

Historic property identification and evaluation efforts are incomplete in Minnesota. A report that covers a Phase II survey of sites on the LLR is forthcoming and will be submitted to DOS for review under the stipulations of the PA. Additional addendum reports for a variety of pipeline facilities, access roads, and survey gaps will also be forwarded to DOS for review and then forwarded to the SHPO for review. No correspondence has been received from the Minnesota SHPO. Concurrence with DOS findings of eligibility and effect is therefore assumed pursuant to 36 CFR 800.3(c)(4) as the review period has extended beyond 30 days from the date of DOS's submission.

4.11.6.3 Wisconsin

No previously unrecorded archaeological sites were identified by the 106 Group during the Phase I archaeological investigation and the Addendum I report. One previously recorded site (47DG0116) was identified within the proposed Project corridor but was determined not eligible for listing in the NRHP by DOS.

The historical resource survey of the proposed Project corridor identified 21 architectural properties 45 years of age or older. Six of the architectural properties are segments of railroad lines. DOS has determined that four of the railroad lines are not eligible for listing in the NRHP. Two of the railroads are unevaluated and are subject to a Phase II investigation. All of the railroads would be avoided by HDD or boring underneath the railroads. Nine architectural resources were determined by DOS to be not eligible for listing in the NRHP. An additional four architectural resources are unevaluated pending Phase II investigations. DOS has made recommendations on NRHP eligibility and Project effects, and submitted these findings for concurrence to the Wisconsin SHPO. On December 16, 2008, the Wisconsin SHPO concurred with the DOS determination of NRHP eligibility for site 47DG0116 but did not concur with the initial DOS determinations for the four railroads. DOS subsequently confirmed its initial determination that the railroads were not eligible for listing in the NRHP. No additional correspondence has been received from the Wisconsin SHPO concerning these or other findings.

4.11.7 Connected Actions

The Superior Terminal Expansion is the only connected action associated with the Alberta Clipper Project. Permitting for this action is being conducted separately from the Alberta Clipper Project, will include applicable permits from the COE and WDNR, and will potentially be subject to review under Section 106 of the NHPA. The Superior Terminal is located at the terminus of the Alberta Clipper pipeline in Douglas County, Wisconsin. The expansion would consist of five breakout tanks, each with the capacity of 250,000 barrels. The connected action site is located almost entirely in wetlands; however, the area has been historically disturbed. Due to the disturbed soil contexts, intact cultural resources are not likely to be identified during the expansion project. Historic building surveys are being conducted within the Superior Terminal area. Pending information from these surveys will be addressed as part of the PA. The Draft Final PA is provided in Appendix R. If additional historic properties are encountered during construction of the expansion project, they would likely be subject to federal and state regulatory processes and requirements concerning unanticipated discoveries.

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4.12 AIR QUALITY AND NOISE

4.12.1 Air Quality

As described in Section 2.0, the Alberta Clipper Project consists of installation of pipeline and construction of pump stations and associated facilities. During operation, the proposed pump stations would be electrically driven, with electricity to be provided from existing local electric utilities. Backup power would be provided by uninterruptible, 12-volt sealed lead acid or sealed gel cell universal power supply batteries, which would be replaced at 3-year intervals as recommended by the manufacturer. No other stationary sources of air pollutants are proposed.

4.12.1.1 Environmental Setting

Regional climate and meteorological conditions can influence the transport and dispersion of air pollutants that affect air quality. The existing climate and ambient air quality in the Alberta Clipper Project area are described below.

Regional Climate

The proposed Alberta Clipper Project would be constructed in portions of North Dakota, Minnesota, and Wisconsin. The regional climate in the Project area is continental. Representative climate data along the pipeline right-of-way for Thief River Falls, Minnesota; Grand Rapids, Minnesota; and Superior, Wisconsin are presented in Table 4.12.1-1.

Ambient Air Quality

Ambient air quality is regulated by federal, state, and local agencies. EPA has established national ambient air quality standards (NAAQS) for seven criteria pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter, carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS were developed to protect human health (primary standards) and human welfare (secondary standards). Table 4.12.1-2 lists the NAAQS for the seven criteria pollutants. State air quality standards cannot be less stringent than the NAAQS. North Dakota has more stringent standards for SO_2 (i.e., 0.023 parts per million [ppm] annual average, 0.099 ppm 24-hour average, and 0.273 ppm 1-hour average), and state standards for hydrogen sulfide (H_2S) (10 ppm instantaneous concentration not to be exceeded, 0.2 ppm maximum 1-hour concentration not to be exceeded more than once per month, 0.1 ppm 24-hour maximum not to be exceeded more than once per year, and 0.02 ppm maximum arithmetic mean averaged over 3 consecutive months). Minnesota has a more stringent 1-hour standard for CO (carbon monoxide) (i.e., 30 ppm 1-hour maximum); a more stringent 3-hour standard for SO_2 in Air Quality Control Regions 127, 129, 130, and 132 (i.e., 915 $\mu g/m^3$ 3-hour maximum) and a state 1-hour SO_2 standard (i.e., 1,300 $\mu g/m^3$ 1-hour maximum); and state H_2S standards (i.e., 0.5 ppm 0.5-hour standard not to be exceeded more than two times per year and 0.3 ppm 0.5-hour standard not to be exceeded more than two times in any 5 consecutive calendar days). Wisconsin has adopted the NAAQS, with the exceptions of total suspended particulate at 150 $\mu g/m^3$ (24-hour average) and H_2S at 335 $\mu g/m^3$ (24-hour average).

A network of ambient air quality monitoring stations has been established by EPA and state and local agencies to measure and track the background concentrations of criteria pollutants across the United States, and to assist in designation of nonattainment areas. To characterize the background air quality in the regions surrounding the proposed Project area, data from air quality monitoring stations were obtained. A summary of the available regional background air quality concentrations is presented in Table 4.12.1-3.

TABLE 4.12.1-1
Representative Climate Data in the Vicinity of the Alberta Clipper Project

Measurement (average)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Thief River Falls, Minnesota													
Maximum temperature (ºF)	12	21	34	53	70	77	81	80	68	54	32	17	50
Minimum temperature (ºF)	-6	2	15	30	43	52	56	55	45	33	17	1	29
Total precipitation (inches)	**0.22**	**0.28**	**0.44**	**0.96**	**2.59**	**3.39**	**3.43**	**3.14**	**2.44**	**1.68**	**0.86**	**0.26**	**19.69**
Grand Rapids, Minnesota													
Maximum temperature (ºF)	17	26	38	54	68	76	80	78	67	54	35	21	51
Minimum temperature (ºF)	-4	2	15	28	41	50	55	52	43	33	19	3	28
Total precipitation (inches)	**1.01**	**0.61**	**1.25**	**1.84**	**2.90**	**4.60**	**4.60**	**3.70**	**3.08**	**2.74**	**1.59**	**0.86**	**28.78**
Superior, Wisconsin													
Maximum temperature (ºF)	20	26	35	47	57	68	75	73	65	53	37	25	48
Minimum temperature (ºF)	1	8	18	31	39	48	57	58	48	38	24	9	32
Total precipitation (inches)	**0.95**	**0.53**	**1.37**	**1.58**	**2.26**	**3.71**	**3.73**	**3.69**	**3.71**	**1.89**	**1.39**	**0.79**	**25.60**

ºF = Degrees Fahrenheit.

Note: All measurements in the table are averages.

Sources: Weather.com 2008a, 2008b, 2008c.

TABLE 4.12.1-2
National Ambient Air Quality Standards

Pollutant	Time Frame	Primary	Secondary
Particulate matter less than 10 microns in diameter	Annual[a]	Revoked	Revoked
	24-hour[b]	150 μg/m^3	150 μg/m^3
Particulate matter less than 2.5 microns in diameter	Annual[c]	15 μg/m^3	15 μg/m^3
	24-hour[d]	35 μg/m^3	N/A
Sulfur dioxide	Annual	0.030 ppm (80 μg/m^3)	N/A
	24-hour[b]	0.14 ppm (365 μg/m^3)	N/A
	3-hour[b]	N/A	0.5 ppm (1,300 μg/m^3)
Carbon monoxide	8-hour[b]	9 ppm (10,000 μg/m^3)	N/A
	1-hour[b]	35 ppm (40,000 μg/m^3)	N/A
Nitrogen dioxide	Annual	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)
Ozone	8-hour[e]	0.075 ppm (147 μg/m^3)	0.075 ppm (147 μg/m^3)
	1-hour[f]	0.12 ppm (235 μg/m^3)	0.12 ppm (235 μg/m^3)
Lead	Quarterly	1.5 μg/m^3	1.5 μg/m^3

μg = Microgram(s).
m^3 = Cubic meter(s).
N/A = Not applicable.
ppm = Part(s) per million.

[a] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the U.S. Environmental Protection Agency (EPA) revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

[b] Not to be exceeded more than once per year.

[c] To attain this standard, the 3-year average of the weighted annual mean particulate matter less than 2.5 microns in diameter concentrations from single- or multiple community-oriented monitors must not exceed 15.0 μg/m^3.

[d] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m^3 (effective December 17, 2006).

[e] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations, measured at each monitor within an area over each year, must not exceed 0.08 ppm.

[f] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1. As of June 15, 2005, EPA revoked the 1-hour ozone standard in all areas, except in the fourteen 8-hour ozone nonattainment Early Action Compact Areas.

TABLE 4.12.1-3
Regional Background Air Quality Concentrations for the Alberta Clipper Project 2005–2007 Data

Location	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)		SO_2 (ppm)			CO (ppm)		NO_2 (ppm)	O_3 (ppm)	Lead (µg/m^3)
	24-Hr	Annual	24-Hr	Annual	24-Hr	3-Hr	8-Hr	1-Hr	Annual	8-Hr[a]	Quarterly
Duluth, St. Louis County, Minnesota	72	6.4	21	N/A	N/A	N/A	3.1	4.6	N/A	0.059	0.01
Cloquet, Carlton County, Minnesota	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.004	0.061	N/A
Cass County, Minnesota	N/A	5.4	18.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Douglas County, Wisconsin	29.4	NA	NA	11.8	11.2	5.4	904.	950.5	8.0	NA	0.01
Superior, Douglas County, Wisconsin	47	NA	NA	43.2	30.5	8.6	1,362.7	1,192.1	24.1	NA	0.02

µg = Microgram(s).
CO = Carbon monoxide.
m^3 = Cubic meter(s).
N/A = Not applicable.
NO_2 = Nitrogen dioxide.
O_3 = Ozone.
ppm = Part(s) per million.
PM_{10} = Particulate matter less than 10 microns in diameter.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
SO_2 = Sulfur dioxide.

[a] The 8-hour average ozone concentrations are the fourth-highest daily maximums.

Duluth CO from monitor 271370018, Duluth; ozone and $PM_{2.5}$ from monitor 271377550, Duluth; lead from monitor 271377555, Duluth; and PM_{10} from monitor 271370032, Duluth.

Cloquet ozone from monitor 270177416, Cloquet; NO_2 from monitor 270177416, Cloquet. Cass County $PM_{2.5}$ from monitor 270210001, Cass County.

SO_2 monitoring not performed in vicinity of the Project.

Sources: EPA 2008. Monitor Values Report. Available online at: <http://www.epa.gov/air/data/reports.html>. $PM_{2.5}$ and ozone are the 3-year average from 2005 to 2007. Other pollutants are for the highest year during 2005–2007. State of Wisconsin 2008. Regional Background Concentrations. Available online at: http://dnr.wi.gov/air/pdf/RegionalBackgroundConcentrationsFINAL2.pdf.

Based on available regional background air quality concentrations, EPA has characterized all areas of the United States as attainment, unclassifiable, nonattainment, or maintenance. Areas where the ambient air concentration of a pollutant is less than the NAAQS are designated as attainment; areas where no ambient air quality data are available are designated as unclassifiable. Unclassifiable areas are treated as attainment areas for the purposes of permitting stationary sources. Areas are designated as nonattainment when a pollutant's ambient air concentration is greater than the NAAQS. If an area was designated as nonattainment and has since demonstrated compliance with the NAAQS, it is considered a maintenance area. While maintenance areas are treated as attainment areas for the purposes of permitting stationary sources, states may have specific provisions to ensure that the area will continue to comply with the NAAQS.

The Alberta Clipper Project would be located entirely within attainment areas (i.e., it would not pass through any nonattainment or maintenance areas).

4.12.1.2 Regulatory Requirements

The CAA and its implementing regulations (42 USC 7401 et seq., as amended in 1977 and 1990) are the basic federal statutes and regulations governing air pollution in the United States. The following federal requirements have been reviewed for applicability to the proposed Project:

- New Source Review (NSR) / Prevention of Significant Deterioration (PSD);
- Air Quality Control Regions (AQCRs);
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAPs)/Maximum Achievable Control Technology (MACT);
- Chemical Accident Prevention Provisions;
- Title V Operating Permits; and
- General Conformity Rule.

New Source Review/Prevention of Significant Deterioration

New Source Review refers to the pre-construction permitting programs under Parts C and D of the CAA that must be satisfied before construction can begin on new major sources or major modifications to existing major sources located in attainment or unclassified areas. This review may include a PSD review. This review process is intended to keep new air emission sources from causing existing air quality to deteriorate beyond acceptable levels codified in the federal regulations. For sources located in nonattainment areas, the Nonattainment New Source Review (NNSR) program is implemented for the pollutants for which the area is classified as nonattainment. Since the proposed Project would be located entirely in attainment areas, NNSR is not applicable to the proposed Project.

If construction or modification of a major stationary source located in an attainment area would result in emissions greater than the significance thresholds, a project must be reviewed in accordance with PSD regulations. Construction or modification of a major or, in some jurisdictions, non-major stationary source in a nonattainment or PSD maintenance (Section 175A) area requires that a project be reviewed in accordance with nonattainment NSR regulations. The major potential source of air emissions from the proposed Project would be the operation of the Clearbrook Terminal. Potential future emissions are 68.99 tons of volatile organic compounds (VOCs) per year at this location. The level of these emissions

would not trigger PSD review. However, if the state determines that further PSD review is warranted then additional air quality analyzes would be required.

Air Quality Control Region

AQCRs are categorized as Class I, Class II, or Class III. Class I areas are designated specifically as pristine natural areas or areas of natural significance; these areas receive special protections under the CAA because of their good air quality. If a new source or major modification to an existing source is subject to the PSD program requirements and is within 62 miles (100 kilometers) of a Class I area, the facility is required to notify the appropriate federal officials and assess the impacts of the proposed Project on the Class I area. Class III designations, intended for heavily industrialized zones, can be made only on request and must meet all requirements outlined in 40 CFR Part 51.166. The remainder of the United States is designated as Class II.

The proposed Project is not deemed a major stationary source or major modification and therefore the rules regarding PSD programs for Class I areas would not apply to the pipeline. Further, none of the pump stations would be located within 100 kilometers of a Class I area and therefore there is no requirement for notification of federal land managers. As to the Superior tank terminal, WDNR has advised that it will notify the land managers when Enbridge applies for a PSD permit. Impacts on the Rainbow Lake Wilderness Class I area resulting from this connected action are expected to be negligible.

New Source Performance Standards

The NSPS, codified at 40 CFR Part 60, establish requirements for new, modified, or reconstructed units in specific source categories. NSPS requirements include emission limits, monitoring, reporting, and record keeping. No NSPS subparts would apply to the proposed Project.

National Emission Standards for Hazardous Air Pollutants/ Maximum Achievable Control Technology

NESHAPs, codified in 40 CFR Parts 61 and 63, regulate hazardous air pollutant (HAP) emissions. Part 61 was promulgated prior to the 1990 CAA Amendments and regulates only eight types of hazardous substances (asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride). The proposed Project would not include facilities that fall under any of the source categories regulated by Part 61; therefore, the requirements of Part 61 are not applicable.

The 1990 CAA Amendments established a list of 189 additional HAPs, resulting in the promulgation of Part 63. Part 63 considers any source with the potential to emit 10 tons per year (tpy) of any single HAP or 25 tpy of HAPs in aggregate as a major source of HAPs. Non-major HAP sources are known as area sources. Also known as the "MACT standards," Part 63 regulates HAP emissions from major sources of HAPs and specific source categories that emit HAPs. For a limited number of specific source categories, MACT standards apply to both major and area HAP sources. None of the Alberta Clipper Project facilities would have the potential to emit HAP emissions greater than 10 tpy for a single HAP, nor would they have the potential to emit 25 tpy of multiple HAPs. Thus, the proposed Project facilities would not be considered a major source of HAP emissions and would not be subject to NESHAPs. None of the MACT standards for area sources apply to the proposed Project.

Chemical Accident Prevention Provisions

The chemical accident prevention provisions, codified in 40 CFR Part 68, are federal regulations designed to prevent the release of hazardous materials in the event of an accident and to minimize potential impacts

if a release did occur. The regulations contain a list of substances and threshold quantities for determining applicability to stationary sources. If a stationary source stores, handles, or processes one or more substances on this list in a quantity equal to or greater than specified in the regulation, the facility must prepare and submit a Risk Management Plan. If a facility does not have a listed substance onsite, or if the quantity of a listed substance is below the applicability threshold, the facility does not need to prepare a Risk Management Plan. No hazardous materials subject to the Chemical Accident Prevention Provision/ Risk Management Plan (40 CFR Part 68) would be stored at any of the Alberta Clipper Project aboveground facilities in quantities equal to or greater than the threshold quantities; therefore, a Risk Management Plan is not required.

Title V Operating Permits

Title V of the federal CAA requires individual states to establish an air operating permit program. The requirements of Title V are outlined in 40 CFR Parts 70 and 71, and the permits required by these regulations often are referred to as Part 70 or 71 permits. Because the proposed Project would not include operation of significant stationary sources of air pollutants, the proposed Project would not trigger Title V permitting.

General Conformity Rule

The General Conformity Rule was designed to require federal agencies to ensure that proposed projects conform to the applicable State Implementation Plan (SIP). General Conformity regulations apply to project-wide emissions of pollutants for which the project areas are designated as nonattainment (or, for ozone, its precursors nitrogen oxides [NO_x] and VOCs) that are not subject to NSR and that are greater than the significance thresholds.

A General Conformity analysis is required for pollutant emissions not subject to NSR (for example, mobile source emissions) that would occur in nonattainment areas. General Conformity is not applicable to the proposed Project because all construction and operations would occur in attainment areas.

4.12.1.3 Potential Impacts and Mitigation

Two types of impacts on air quality were considered for this analysis: temporary impacts from construction-related emissions and long-term impacts associated with emissions generated from continued operation of a stationary source (e.g., pump stations).

Construction Impacts

Air quality impacts associated with construction of the proposed Project would include emissions from fugitive dust, and emissions from fossil-fueled construction equipment, open burning, and temporary fuel transfer systems and associated storage tanks.

Fugitive Dust

Fugitive dust is a source of respirable airborne particulate matter, including PM_{10} and $PM_{2.5}$ (particulate matter less than 10 and 2.5 microns in diameter, respectively), that could result from blasting and vehicle traffic on paved and unpaved roads. The amount of dust generated is a function of construction activities, silt, moisture content of the soil, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions would be greater during drier month, and in fine-textured soils.

Emissions of particulate matter arising from fugitive dust are regulated by state and local agencies. Tribal regulations may also apply on tribal lands. North Dakota has authority to regulate fugitive dust under North Dakota Administrative Code 33-15-17, Minnesota has authority under Minnesota Administrative Rules 7011.0150, and Wisconsin has authority under NR 415.04. Each of these regulations requires measures to prevent fugitive dust from becoming airborne and leaving the property boundary. Enbridge proposes to apply water to the right-of-way for dust suppression. The majority of pipeline construction activity would pass by a specific location within a 30-day period, thereby resulting in short-term impacts at any one location during construction.

Fossil-Fueled Construction Equipment

Large earth-moving equipment, skip loaders, trucks, and other mobile sources may be powered by diesel or gasoline and are sources of combustion emissions, including NO_x, CO, VOCs, SO_2, PM_{10}, $PM_{2.5}$, and small amounts of HAPs. Construction equipment also emits greenhouse gases. Expected emissions from construction are shown in Table 4.12.1-4. Gasoline and diesel engines must comply with the EPA mobile source regulations in 40 CFR Part 86 for on-road engines and 40 CFR Part 89 for non-road engines. These regulations are designed to minimize emissions. Furthermore, to implement the CAA, EPA has established rules to require that sulfur content in on-road and off-road diesel fuel be significantly reduced. On June 1, 2006, 80 percent of diesel fuel for on-road use produced by U.S. refineries was required to be reduced from 500 to 15 ppm sulfur. Additionally, on June 1, 2007, diesel fuel for non-road engines was reduced from 5,000 to 500 ppm sulfur. On June 1, 2010, EPA will require all on-road and off-road (non-road) diesel fuel to meet a limit of 15 ppm sulfur. Enbridge would encourage its construction contractors to use 15 ppm sulfur diesel fuel prior to June 1, 2010 depending upon availability in the construction area. There are currently no federal regulations or guidelines for maximum GHG emissions.

In addition to the use of low-sulfur fuel, Enbridge would maintain all fossil-fueled construction equipment in accordance with manufacturer's recommendations to minimize construction-related emissions.

TABLE 4.12.1-4
Estimated Construction Emissions for the Alberta Clipper Project and Superior Terminal Tank Additions

Emission Source	$PM_{2.5}$ (tons)	PM_{10} (tons)	NO_x (tons)	SO_2 (tons)	CO (tons)	VOCs (tons)	GHG (tonnes)
Diesel-fueled equipment	18.8	20.0	359.7	8.5	52.1	20.8	25,037
Gasoline-fueled equipment	0.3	0.3	4.3	<0.1	20.3	1.6	2,240
Paved road PM	1.8	11.9	-	-	-	-	-
Unpaved road PM	<0.1	0.2	-	-	-	-	-
Total	**20.9**	**32.4**	**364.0**	**8.5**	**72.4**	**22.4**	**27,276**

PM = Particulate matter.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
PM_{10} = Particulate matter less than 10 microns in diameter
NOx = Oxides of nitrogen.
VOC = Volatile organic compound.
GHG = Greenhouse gas expressed as carbon dioxide (CO_2) equivalent.

Open Burning

Burning cleared materials has been proposed as a possible method for clearing the right-of-way of woody debris along the route and is fairly typical during pipeline construction. Open burning of cleared materials from construction activities has the potential to affect air quality. However, prior to construction it is unknown how much open burning would occur and in what quantities and locations. Timber valuations have not been conducted to characterize and quantify the timber resources along the route, including the volume of potentially merchantable timber. Other variables with regard to open burning would include the identification of markets for cleared timber and consultations with individual landowners.

All of the states along the route of the proposed Project regulate open burning through local permitting, approval, and/or notification processes. Additionally, tribal open burning permits may be required on tribal lands. Enbridge would obtain all necessary open burning permits, approvals, and make notifications prior to conducting any open burning of land-clearing materials. Enbridge would follow all open burning regulations during such activities, including restrictions on burn location, material, and time, as well as consideration of local air quality.

Temporary Fuel Transfer Systems and Associated Storage Tanks

Temporary fuel transfer systems and tanks have the potential to release VOC emissions. Because most construction equipment would use diesel fuel with a low vapor pressure (<0.01 psi), releases of VOCs would be minimal.

Enbridge's EMP (Appendix C) provides guidelines regarding minimum distances for fuel storage and refueling. Enbridge's SPCC Plan (Appendix E) provides general conditions and additional guidelines, including signage, required on-site mitigation materials and tools, and secondary containment. The following information from the SPCC Plan further addresses these concerns:

For storage and handling of fuels/hazardous liquids, the Contractor would follow proper fuel storage practices, including, but not limited to the following:

- Fuel storage must be at contractor yards only or as approved by Enbridge.
- Proper signage at and adjacent to fuel storage areas must include "Fuel Storage Area – No smoking within 50 feet."
- A minimum of two 30-pound or four 20-pound fire extinguishers must be located and readily available at all fuel storage locations. The extinguishers must be located not less than 25 feet and not more than 75 feet from these locations.
- Tools and materials to stop the flow of leaking tanks and pipes must be kept on-site. Such equipment may include, but not be limited to, plugs of various sizes, 3M tank patches, a hammer, assorted sizes of metal screws with rubber washers, a screwdriver, and plastic tape. Spill kits (see Section 2.3 of the SPCC [Appendix E]) must be located at fuel storage areas.
- Fuels, lubricants, waste oil, and any other regulated substances must be stored in aboveground tanks only.
- Storage tanks and containers must conform to all applicable industry codes.
- A suitable secondary containment structure must be utilized at each fuel storage site. These structures must be lined with suitable plastic sheeting, provide a minimum containment

volume equal to at least 150 percent of the volume of the largest storage vessel, and provide at least 1 foot of freeboard.

- If earthen containment dikes are used, they must be constructed with slopes no steeper than 3:1 (horizontal to vertical) to limit erosion and provide structural stability.
- Secondary containment areas must not have drains. Precipitation may be drawn off as necessary. If visual inspection indicates that no spillage has occurred in the secondary containment structure, accumulated water may be drawn off and sprayed on the surrounding upland areas. If spillage has occurred in the structure, accumulated waste must be drawn off and pumped into drum storage for proper disposal.
- Vehicle maintenance wastes, including used oils and other fluids, must be handled and managed by personnel trained in the procedures outlined in this plan. Vehicle maintenance wastes would be stored and disposed of in accordance with Section 7.0 of the SPCC Plan (Appendix E).

With regard to refueling practices, the following measures from the SPCC Plan (Appendix E) would be implemented:

- Fuels must be dispensed by authorized personnel during daylight hours only.
- Fuel dispensing operations must be attended by authorized personnel at all times. Personnel must be stationed at both ends of the hose during fueling unless both ends are visible and are readily accessible by one person.
- Fuel dispensing equipment (i.e., portable gas cans, nozzles, and hoses) must be of the appropriate type.

Conclusions

Because pipeline construction moves through an area relatively quickly, air emissions typically would be localized, intermittent, and short term. Emissions from fugitive dust, construction equipment combustion, open burning, and temporary fuel transfer systems and associated tanks would be controlled to the extent required by state and local agencies as explained above.

Enbridge would ensure that all construction equipment for the proposed Project is maintained in accordance with the manufacturer's specifications. In addition, to reduce construction emissions of criteria and hazardous air pollutants, Enbridge would encourage its contractors to adopt the following measures (consistent with EPA recommendations for the proposed Project):

- Ensure that diesel-powered equipment is properly maintained and shut off when not in use;
- Prohibit engine tampering to increase horsepower;
- Where practical, operate equipment as far as possible from residential areas and sensitive receptors (schools, daycare centers, and hospitals);
- Use ultra-low sulfur diesel fuel for their equipment if it is available for purchase within a reasonable distance to the construction spreads;
- Minimize, to the extent practical, construction-related trips of workers and equipment; and
- Where practical, use 1996 or newer model year equipment and vehicles.

Further, Enbridge commits to the following measures for its employees driving company-owned or leased vehicles:

- Ensure that diesel-powered equipment is properly maintained and shut off when not in use;
- Prohibit engine tampering to increase horsepower;
- Use ultra-low sulfur diesel fuel for vehicles if it is available for purchase within a reasonable distance to the construction spreads;
- Minimize, to the extent practical, construction-related trips; and
- Where practical, use 1996 or newer model year vehicles.

If Enbridge complies with applicable regulations, emissions from construction-related activities associated with the proposed Project would not significantly affect local or regional air quality.

Operations Impacts

At capacity in 2010, Enbridge estimates that electricity use for the entire system would be 1.8 million megawatt hours. After 2010, it is expected that this value would increase over time, based on the hydraulics of the system. Consequently, no long-term emissions would result from operations associated with the proposed Project, except for fugitive VOC emissions from valves and pumping equipment. Because operating emissions are minimal, no operational permits would be required. There are no ambient air quality standards or increments for VOC, although there are ozone standards for which VOC is a precursor. Regardless, operation of the proposed Project would not cause or contribute to a violation of any federal, state, or local air quality standards.

4.12.1.4 Connected Actions

Enbridge operates the Superior Terminal located in Douglas County, Wisconsin. Five new 250,000-barrel crude oil tanks would be constructed at the Superior Terminal to accommodate higher crude oil throughput from the proposed Project. Five 207-horsepower and one 335-horsepower diesel-fueled existing emergency generators would be used to provide backup power. The emergency generators would operate less than 200 hours/year and are not part of the proposed Project.

The Superior Terminal is currently a petroleum storage and transfer facility with more than 7,227,000 barrels of storage. The Superior Terminal emitted 100.9 tons of VOCs in 2007. The Superior Terminal meets the definition of a major stationary source given at 40 CFR 51.166(b)(1)(i)(a). Actual average emissions for 2006–2007 were 97.6 tons of VOCs per year, and proposed project emissions are 39.1 tons of VOCs per year. When this project's emissions are considered with emissions from recently permitted projects at the facility, the total emission exceeds the major modification threshold of 40 tpy of VOCs. Therefore, the proposed expansion at Superior Terminal is a major modification and is subject to PSD review, which would require an air quality analysis. The new tanks are subject to best available control technology (BACT) analysis as part of PSD. The Superior Terminal is within 100 kilometers (61 miles) of a Class I area. Specifically, the Rainbow Lake Wilderness is located 61 kilometers (about 37 miles) from the Superior Terminal. Therefore, expansion of the terminal is subject to a federal Class I area impact assessment as part of the air permitting process.

Subpart Kb of 40 CFR 60, Standards of Performance for Volatile Organic Liquid Storage Vessels, lists affected emission sources as storage vessels containing volatile organic liquids. Regulatory applicability is dependent on the construction date, size, and vapor pressure of the storage vessel and its contents. Subpart Kb applies to new tanks, unless otherwise exempted, with a storage capacity between 75 m^3

(19,813 gallons) and 151 m^3 (39,890 gallons) and that contain VOCs with a maximum true vapor pressure greater than or equal to 15.0 kilopascals (kPa). Subpart Kb also applies to any new tanks with a storage capacity greater than or equal to 151 m^3 and that contain VOCs with a maximum true vapor pressure greater than or equal to 3.5 kPa. The five 250,000-barrel oil tanks to be constructed at Superior Terminal would be subject to Subpart Kb.

The Superior Terminal has an existing Title V operating permit, which would be modified to cover operation of the five new tanks.

4.12.2 Noise

4.12.2.1 Environmental Setting

The ambient sound level of a region is defined by the total noise generated within the specific environment and is usually comprised of sound emanating from natural and artificial sources. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day and throughout the week. This variation is caused in part by changing weather conditions and the effects of seasonal vegetative cover.

The proposed Project would be constructed in primarily rural areas of North Dakota and Minnesota, and in the urban area of Superior, Wisconsin.

Noise Receptors near the Pipeline Right-of-Way

Approximately 322 residences and three commercial/public assembly places are within 500 feet of the proposed pipeline construction right-of-way (Enbridge 2008a). See additional discussion of residences proximal to the right-of-way in Section 4.9.2.

Noise Receptors near Pump Stations

Table 4.12.2-1 summarizes the nearest noise-sensitive areas (NSAs) and the number of residences within 0.5 mile of each proposed pump station. The proximity of the nearest NSAs ranges from 525 feet at the Deer River Pump Station to 2,250 feet at the Viking Pump Station. All NSAs are located in Minnesota.

Ambient noise surveys were conducted at the Deer River Pump Station on July 14, 2008; at the Clearbrook Terminal on July 15, 2008; and at the Viking Pump Station on July 16, 2008 (Enbridge 2008b).

The Deer River Pump Station is located approximately 1 mile east of Deer River in Itasca County, Minnesota. The land surrounding the site consists primarily of farmland. The nearest NSA (NSA #1) is a residence about 525 feet southeast of the pump station. Other NSAs include residences about 2,000 feet east (NSA #2), and 1,750 feet north-northwest (NSA #3) of the pump station. Enbridge conducted an ambient sound level survey at NSAs #1, 2, and 3. Noise sources during the sound level survey included traffic on Highway 2, birds, wind, and noise from the Deer River Pump Station—which was predominant at NSA #1 but not at NSA #2 and NSA #3. Measured noise at NSA #1 was 48.6 dBA (A-weighted decibel scale), with a calculated day-night sound level (L_{dn}) of 55.0 dBA. Measured noise at NSA #2 was 46.9 dBA, with a calculated L_{dn} of 53.3 dBA. Measured noise at NSA #3 was 49.1 dBA, with a calculated L_{dn} of 55.5 dBA. Calculated L_{dn} values were based on daytime noise measurements. Pump station noise tends to be stable throughout the day and night, so the measured noise values provide a good basis for estimating the L_{dn}—particularly at NSA #1 where pump station noise predominated.

TABLE 4.12.2-1 Nearest Noise-Sensitive Areas for the Alberta Clipper Project					
State/ County	Pump Station/ Terminal	Milepost of Pump Station	Distance from Source to Nearest Noise-Sensitive Area (feet)	Direction from Pump Station	Number of Residences within 0.5 Mile of Pump Station
MN, Kittson	Donaldson	814.1	1,880	East-southeast	1
MN, Marshall	Viking	848.2	2,250	South-southeast	1
MN, Clearwater	Clearbrook	909.5	1,850	South	25
MN, Itasca	Deer River	995.8	525	Southeast	4

Sources: Enbridge 2008a, 2008b.

The Clearbrook Terminal is located 0.5 mile east of Clearbrook in Clearwater County, Minnesota. The land surrounding the site consists primarily of farmland and forested land. The nearest NSA (NSA #3) is a residence about 1,850 feet south of the terminal. Other NSAs include residences approximately 3,600 feet west-northwest (NSA #1), and 2,650 feet east (NSA #2) of the terminal. Enbridge conducted an ambient sound level survey at NSAs #1–3. Noise sources during the sound level survey included distant traffic, birds, wind, distant construction equipment, noise from the Minnesota Pipeline Terminal, and noise from the Clearbrook Terminal. Noise from the Minnesota Pipeline Terminal was predominant at NSA #3, but not at NSA #1 and NSA #2. Measured noise at NSA #1 was 43.6 dBA, with a calculated L_{dn} of 50.0 dBA. Measured noise at NSA #2 was 46.0 dBA, with a calculated L_{dn} of 52.4 dBA. Measured noise at NSA #3 was 45.5 dBA, with a calculated L_{dn} of 51.9 dBA. Calculated L_{dn} values were based on daytime noise measurements. Pump station noise tends to be stable throughout the day and night, so the measured noise values provide a good basis for estimating the L_{dn}—particularly at NSA #3, where pump station noise predominated.

The Viking Pump Station is located 1.3 miles southwest of Viking in Marshall County, Minnesota. The land surrounding the site consists primarily of farmland. The nearest NSA (NSA #1) is a residence about 2,550 feet south-southeast of the pump station. Other NSAs include a residence about 4,100 feet northeast (NSA #2) of the pump station. Enbridge conducted an ambient sound level survey at NSAs #1 and 2. Noise sources during the sound level survey included distant traffic, birds, wind, and a distant tractor. Noise from the Viking Pump Station was audible at NSA #2. Measured noise at NSA #1 was 36.6 dBA, with a calculated L_{dn} of 43.0 dBA. Measured noise at NSA #2 was 37.7 dBA, with a calculated L_{dn} of 44.1 dBA. Calculated L_{dn} values were based on daytime noise measurements.

Measurements conducted at night are often lower than daytime measurements due, for example, to decreased traffic levels and reduced bird activity. A calculated L_{dn} that included nighttime measurements would likely be lower than the value based solely on daytime measurements for those NSAs where pump station noise was not predominant.

No noise measurements were conducted at the Donaldson Pump Station in Kittson County, Minnesota.

4.12.2.2 Regulatory Requirements

Two measurements used by federal agencies to relate the time-varying quality of environmental noise to its known effect on people are the 24-hour equivalent sound level ($L_{eq[24]}$) and the day-night sound level

(L_{dn}). The $L_{eq(24)}$ is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{dn} is the $L_{eq(24)}$ with 10 decibels (dB) on the A-weighted decibel scale (dBA) added to nighttime sound levels between the hours of 10 p.m. and 7 a.m. to account for people's greater sensitivity to sound during nighttime hours.

In 1974, EPA published "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." This document provides information for state and local agencies to use in developing their ambient noise standards. EPA identified outdoor and indoor noise levels to protect public health and welfare. An $L_{eq(24)}$ of 70 dB was identified as the level of environmental noise that would prevent any measurable hearing loss over a lifetime. An L_{dn} of 55 dBA outdoors and an L_{dn} of 45 dBA indoors were identified as noise thresholds that would prevent activity interference or annoyance. These levels are not "peak" levels but are 24-hour averages over several years. Occasional high levels of noise may occur. An L_{dn} of 55 dBA is equivalent to a continuous noise level of 48.6 dBA. Typical noise levels are as follows:

- Quiet room: 28–33 dBA
- Refrigerator: 40–43 dBA
- Computer: 47–35 dBA
- Forced hot air heating system: 42–52 dBA
- Microwave: 55–59 dBA
- Clothes dryer: 56–58 dBA

With regard to increases in decibels measured on the A-weighted noise level scale, the following relationships occur:

- A change of 1 dBA cannot be perceived by humans, except in carefully controlled laboratory environments;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference by humans;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

Minnesota has state-level noise regulation authority under Minnesota Administrative Rules Section 7030. This rule limits the noise contribution from a facility such as a pump station to residences to 50 dBA at night and 60 dBA during the day, based on a 1-hour average that would not be exceeded 50 percent of the time (L_{50}). Pump stations tend to operate at a reasonably constant noise level. Therefore, for sources that produce constant noise levels, Rule 7030 can be simplified as a worst case to limit noise from pump stations to a noise level of 50 dBA at any residence. North Dakota and Wisconsin do not have state-level noise regulations. None of the counties that would be traversed by the proposed Project have county-level regulatory noise limits.

4.12.2.3 Potential Impacts and Mitigation

Noise impacts for a pipeline project generally fall into two categories: temporary impacts resulting from construction equipment and long-term or permanent impacts resulting from operation of the facility.

Construction Impacts

Construction of the proposed Project would be similar to other pipeline projects in terms of schedule, equipment used, and types of activities. Construction would increase noise levels in the vicinity of Project activities, and the noise levels would vary during the construction period—depending on the construction phase.

Pipeline construction generally proceeds at rates ranging from several hundred feet to 1 mile per day. However, due to the assembly-line method of construction, pipeline construction activities in any one area could generally last from 1 week to 30 days. Because the pipeline construction moves through an area relatively quickly, noise impacts typically would be localized, intermittent, and short term. Construction of aboveground facilities would take approximately 14 months to complete.

Residential, agricultural, and commercial areas within 500 feet of the proposed Project right-of-way would experience short-term inconvenience from the construction equipment noise. Although individuals and livestock in the immediate vicinity of the construction activities may be temporarily disturbed, the impact on the noise environment at any specific location along the proposed pipeline route would be short term. Similarly, noise associated with construction of the proposed aboveground facilities would be intermittent during the construction period, but the overall impact would only occur during construction (short term) and is not expected to be significant. Further, nighttime noise levels would normally be unaffected because most construction activities would be limited to daylight hours.

HDD operations often used to cross under waterbodies and highways are typically 24-hours-per-day operations. The drilling rig, pumps, generators, and mobile equipment used for HDD operations produce noise that may impact nearby NSAs. Table 4.12.2-2 lists the North Dakota HDD entry site where the noise contribution from HDD operations may exceed 55 dBA L_{dn} at the nearest NSA, assuming 24-hour HDD operations. Table 4.12.2-3 lists Minnesota HDD sites where the noise contribution from HDD operations may exceed the state 50-dBA nighttime standard. No waterbodies or highways in Wisconsin are proposed to be crossed using the HDD method.

TABLE 4.12.2-2
North Dakota Locations with Predicted HDD Operation Noise Impacts Greater Than 55 dBA L_{dn}

HDD Site	HDD Location	Calculated L_{dn} due to HDD Activity (dBA)	Calculated L_{dn} due to HDD Activity with Noise Mitigation (dBA)
#3 entry	Interstate 29	65.3	58.6

dBA = A-weighted decibel scale.
HDD = Horizontal directional drilling.
Ldn = Day-night average sound level.

TABLE 4.12.2-3 Minnesota Locations with Predicted HDD Operation Noise Impacts Greater Than 50 dBA			
HDD Site	**HDD Location**	**Calculated Noise Contribution due to HDD Activity (dBA)**	**Calculated Noise Contribution due to HDD Activity with Noise Mitigation (dBA)**
#6 entry	Tamarac River	54.0	47.4
#8 entry	Snake River	52.5	45.9
#9 entry	Red Lake River	60.3	53.7
#9 exit	Red Lake River	51.3	44.7
#10 entry	Clearwater River/US 59	58.8	52.2
#11 exit	West Four Legged Lake	52.5	45.9
#13 entry	Bemidji Area	58.8	52.2
#13 exit	Bemidji Area	55.2	48.6
#14 entry	Mississippi River	64.3	57.6
#14 exit	Mississippi River	61.6	55.0
#15 entry	East Bemidji Area	51.7	45.1
#18 entry	Ball Club River	64.3	57.6
#19 entry	Deer River	53.6	47.0
#20 entry	Prairie River	55.9	49.3

dBA = A-weighted decibel scale.
HDD = Horizontal directional drilling.
Ldn = Day-night average sound level.

Table 4.12-2-2 shows that the HDD#3 entry site at Interstate 29 would exceed 55 dBA L_{dn} with temporary noise barriers if 24-hour operations were conducted. Additional mitigation measures may or may not be able to achieve the 55-dBA L_{dn} level.

Table 4.12.2-3 shows that HDD #6 entry, #8 entry, #9 exit, #11 exit, #13 exit, #15 entry, #19 entry, and #20 entry would produce noise contributions less than 50 dBA during daytime/nighttime activities if temporary noise barriers are used. HDD #9 entry, #10 entry, #13 entry, #14 entry, #14 exit, and #18 entry would produce a noise contribution in excess of 50 dBA during daytime/nighttime activities with temporary noise barriers. Additional noise mitigation measures may or may not achieve the 50-dBA nighttime level.

If noise from HDD operations cannot be mitigated to the required level, other measures such as providing temporary lodging at a local motel for affected residents would be used to avoid exposing residents to objectionable noise.

Noise impacts from construction would be temporary and would be minor if appropriate mitigation measures are implemented.

Operations Impacts

Noise impacts from operation of the pipeline would originate from the pump stations. Material traveling through the buried pipeline would not be expected to emit audible noise above the surface or a perceptible level of vibration.

Table 4.12.2-4 shows the existing and projected noise levels for the Deer River Pump Station. The expected noise level at NSA #1 would be 54 dBA due to sound generated by the existing and new equipment at the station. When combined with the existing ambient noise level, the result would be about 55 dBA at NSA #1. The expected noise level at NSA #2 would be 42 dBA due to station noise and 47 dBA when combined with the existing ambient noise level. The expected noise level at NSA #3 would be 40 dBA due to station noise and 49 dBA when combined with the existing ambient noise level. The predicted pump station noise contribution at NSA #1 would exceed the Minnesota Administrative Rules Section 7030 limit of 50 dBA.

Proposed noise reduction measures for the Deer River Pump Station include (Enbridge 2008b):

- The pump house building roof and walls should be constructed with an exterior steel skin of 22 gauge metal, interior insulation of 4-inch thick unfaced mineral wool having 6–8 pounds per cubic foot uniform density, and internal 24-gauge perforated liner.
- Entry doors should have a minimum STC-36 sound rating and should seal well with the doorframe and be self-closing.
- Wall windows should not be installed; however, a limited number of skylights could be installed.
- Voids and openings in the building walls should be patched and sealed.
- Roll-up doors should have 18-gauge exterior facings; insulated type, 24-gauge interior facings; and should be completely weather stripped to provide a seal.
- The building should be designed to adequately ventilate with all doors closed.
- The A-weighted sound rating for each ventilation system inlet and exhaust should not exceed 40 dBA at 50 feet from the building.
- Low noise transformers should be used.
- Additional measures should be employed as needed to mitigate noise from existing sources.

By applying noise-reducing equipment and site design, the pump station noise contribution at NSA #1 would be reduced below 50 dBA. Consequently, no significant impact on the noise environment would result near the Deer River Pump Station with implementation of these noise-reduction measures.

TABLE 4.12.2-4 Predicted Noise Level Contribution of the Deer River Pump Station at Noise-Sensitive Areas							
Measurement Location/ NSA	**Distance/ Direction of NSA to Compressor Building (feet)**	**Measured Ambient L_d (dBA)**	**Estimated Contribution of Existing Station Equipment at Full Load (dBA)**	**Estimated Contribution of Expansion Project Equipment with Noise Controls (dBA)**	**Estimated Contribution of All Station Equipment with Noise Controls (dBA)[a]**	**Total Estimated (Station Noise Plus Survey Levels) (dBA)**	**Potential Noise Increase (dBA)[b]**
NSA #1/ residence	525 / southeast	48.6	53.9	41.0	<50.0	<50.0	-5.0
NSA #2/ residence	2,000 / east	46.9	41.8	28.1	42.0	47.0	0.1
NSA #3/ residence	1,750 /west-northwest	49.1	39.6	29.4	40.0	49.1	0.0

dBA = A-weighted decibel scale.
NSA = Noise-sensitive area.

[a] Estimated Project sound levels are from operation of the original Deer River Pump Station and expansion Project equipment, with noise control measures installed as recommended.

[b] Estimated increase in the ambient sound levels due to operation of the existing Deer River Pump Station and expansion Project equipment, with noise control measures as recommended.

Table 4.12.2-5 shows the existing and projected noise levels for the Clearbrook Terminal. The expected noise level at NSA #1 would be about 31 dBA due to sound generated by the existing and new equipment at the station. When combined with the existing ambient noise level, the noise level would be about 44 dBA at NSA #1. The expected noise level at NSA #2 would be 43 dBA due to station noise and 47 BA when combined with the existing ambient noise level. The expected noise level at NSA #3 would be about 47 dBA due to station noise and 48 dBA when combined with the existing ambient noise level. Noise levels, including the predicted noise contribution associated with expansion of the Clearbrook Terminal, would be less than 50 dBA at all NSAs. Consequently, there would be no significant impact on the noise environment due to the operation of the Alberta Clipper Project near the Clearbrook Terminal.

TABLE 4.12.2-5							
Predicted Noise Level Contribution of the Clearbrook Terminal at Noise-Sensitive Areas							
Measurement Location/ NSA	**Distance/ Direction of NSA to Compressor Building (feet)**	**Measured Ambient L_d (dBA)**	**Estimated Contribution for Existing Station Equipment at Full Load (dBA)**	**Estimated Contribution for Expansion Project Equipment (dBA)**	**Estimated Contribution for All Station Equipment (dBA)[a]**	**Total Estimated (Expansion Project Plus Survey Levels) (dBA)**	**Potential Noise Increase (dBA)[b]**
NSA #1/ residence	3,600 / west-northwest	43.6	28.4	26.8	30.7	43.7	0.1
NSA #2/ residence	2,650 / east	46.0	40.2	40.0	43.1	47.0	1.0
NSA #3/ residence	1,850 / south	45.5	42.9	44.0	46.5	47.8	2.3

dBA = A-weighted decibel scale.
NSA = Noise-sensitive area.

[a] Estimated Project sound levels are from operation of the original Clearbrook Terminal and expansion Project equipment.

[b] Estimated increase in the ambient sound levels due to operation of the existing Clearbrook Terminal and expansion Project equipment.

Table 4.12.2-6 shows the existing and projected noise levels for the Viking Pump Station. The expected noise level at NSA #1 would be 43 dBA due to sound generated by the existing and new equipment at the station. When combined with the existing ambient noise level, the noise level would be about 41 dBA at NSA #1. The expected noise level at NSA #2 would be 39 dBA due to station noise and 39 dBA when combined with the existing ambient noise level. The predicted noise levels, including expansion of the Viking Pump Station, are less than 50 dBA at all NSAs. Consequently, no significant impact would result on the noise environment near the Viking Pump Station.

TABLE 4.12.2-6							
Predicted Noise Level Contribution of the Viking Pump Station at Noise-Sensitive Areas							
Measurement Location/ NSA	**Distance/ Direction of NSA to Compressor Building (feet)**	**Calculated Ambient L_d (dBA)**	**Estimated Contribution of Existing Station Equipment at Full Load (dBA)**	**Estimated Contribution of Expansion Project Equipment (dBA)**	**Estimated Contribution of All Station Equipment (dBA)[a]**	**Total Estimated (Expansion Project Plus Survey Levels) (dBA)**	**Potential Noise Increase (dBA)[b]**
NSA #1/ residence	2,550 / south-southeast	36.6	41.0	38.7	43.0	40.8	4.2
NSA #2/ residence	4,100 / northeast	37.7	38.2	33.2	39.4	39.0	1.3

dBA = A-weighted decibel scale.
NSA = Noise-sensitive area.

[a] Estimated Project sound levels are from operation of original Viking Pump Station and expansion Project equipment.

[b] Estimated increase in the ambient sound levels due to operation of existing Viking Pump Station and expansion Project equipment.

No noise impact estimates were provided for NSAs at Donaldson Pump Station in Kittson County, Minnesota. The nearest NSA appears to be 2,000 feet east of Donaldson Pump Station. If noise impacts at this NSA are similar to impacts at the NSA located 2,000 feet from the Deer River Pump Station (NSA #2), the expected station noise contribution is 42 dBA. Therefore, noise impacts at the Donaldson Pump Station are expected to be minor.

Noise impacts at the Clearbrook Terminal and Viking Pump Station would be long term and minor. Noise impacts at the Deer River Pump Station would be long term and minor, if appropriate noise mitigation measures are implemented. Noise impacts at the Donaldson Pump Station would be expected to be long term and minor.

4.12.2.4 Connected Actions

The Superior Terminal is located adjacent to another tankage facility and is otherwise surrounded by wooded area. The nearest residences are located approximately 3,600 feet north and northeast of the Superior Terminal. Due to the historical industrial nature of the facility, the substantial distance to the nearest residences, and the intervening wooded area, it is unlikely that construction noise would be a significant issue. The new tanks would not be a significant noise source during operation.

4.12.3 References

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4.13 RELIABILITY AND SAFETY

Transportation of oil by pipeline, including both crude oil and refined petroleum products, involves some risk to the public and the environment in the event of an accident or an unauthorized action and subsequent release of oil; however DOT (2009a) reports that pipelines are the safest means to transport large volumes of hazardous liquids, such as oil. Spills from the proposed Project would have a finite rate of occurrence, would affect the environment to varying degrees, and would be a concern to all stakeholders. This section provides information on safety standards, spill history, potential spills, spill impacts, and mitigation of spills in the following subsections:

- Safety Standards (Section 4.13.1);
- Incident History (Section 4.13.2);
- Risk Assessment (Section 4.13.3);
- Oil Spill Behavior and General Types of Impacts (Section 4.13.4);
- Resource-Specific Impacts (Section 4.13.5); and
- Mitigation Measures (Section 4.13.6).

4.13.1 Safety Standards

This section summarizes the regulatory and industry standards to which the proposed Alberta Clipper Project pipeline would be designed, constructed, operated, and maintained. These include the following:

- U.S. Department of Transportation Standards (Section 4.13.1.1);
- State Inspections (Section 4.13.1.2); and
- Industry Standards (Section 4.13.1.3).

4.13.1.1 U.S. Department of Transportation Standards

DOT is mandated to regulate pipeline safety under 49 USC Chapter 601. As previously described in Section 1.3.3.1, DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety (OPS) administers the national regulatory program to ensure the safe transportation of hazardous liquids by pipeline, including crude oil. OPS develops safety regulations and other approaches to risk management for pipeline systems that mandate safety in the design, construction, testing, operation, and maintenance, and for emergency responses. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to select the appropriate methods to protect people and the environment.

The regulations governing pipeline safety are included in 49 CFR Subtitle B. Of those, Parts 190, 194, 195, 198, and 199 are relevant to hazardous liquids (including crude oil and petroleum product) pipelines. The parts that Enbridge would be required to comply with in designing, constructing, operating, and maintaining the Alberta Clipper Project are summarized below:

- Part 190 describes the procedures used by OPS in carrying out its regulatory duties, including inspection of pipelines and enforcement of the regulations;
- Part 194 contains requirements for oil spill response plans intended to reduce the environmental impact of oil discharged from onshore oil pipelines;

- Part 195 prescribes the safety standards and reporting requirements for hazardous liquid pipelines, including detailed requirements on a broad spectrum of areas related to the safety and environmental protection of hazardous liquid pipelines;
- Part 198 prescribes regulations governing grants-in-aid for state pipeline safety compliance programs; and
- Part 199 requires operators of gas and hazardous liquid pipelines to establish programs for preventing alcohol misuse and to test employees for the presence of alcohol and prohibited drugs; it also provides the procedures and conditions for this testing.

As specified in Parts 194 and 195, Enbridge would be required to develop a comprehensive Emergency Response Plan for the Project for review and approval by OPS prior to initiation of operation. As noted in Section 2.6.5.1, Enbridge's existing ERP for its pipeline system has been approved by OPS and complies with the requirements of 49 CFR Part 194, as well as the requirements of OSHA in its final rules on HAZWOPER. The ERP would be amended to incorporate the Alberta Clipper Project and would be submitted to OPS for review and approval as required by 49 CFR 194. A summary of the procedures included in the ERP is presented in Appendix Q (Summary of Enbridge's Pipeline Integrity and Emergency Response Measures).

Enbridge would also be required to have a written pipeline Integrity Management Program in accordance with Part 195.452 within 1 year after the start of operation; OPS has the authority to review and approve the program. This program would include the results of baseline assessments for the pipeline system and must identify and address high-consequence areas (HCAs). HCAs are defined as follows:

1. A commercially navigable waterway, which means a waterway where a substantial likelihood of commercial navigation exists;
2. A high population area, which means an urbanized area—as defined and delineated by the Census Bureau—that contains 50,000 or more people and has a population density of at least 1,000 people per square mile;
3. Another populated area, which means a place—as defined and delineated by the Census Bureau—that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area; and
4. An unusually sensitive area—explicitly defined in 49 CFR Part 195.6 as drinking water or ecological resource areas that are unusually sensitive to environmental damage from hazardous liquid pipeline releases.

Enbridge would have to implement preventive and mitigating measures to protect any HCA along the proposed route from the consequences of a pipeline failure, with the actions taken dependent on the findings of the baseline assessment included in the Integrity Management Program. This would include conducting a risk analysis of the pipeline segment specific to the HCA to identify additional actions to enhance public safety or for environmental protection.

4.13.1.2 State Inspections

OPS is responsible for regulation, inspection, and enforcement of interstate pipelines, such as the proposed Alberta Clipper Project In states where OPS and the state have a special agreement in place, the state has been delegated inspection authority for compliance with federal rules, although OPS retains ultimate enforcement authority. The Minnesota Office of Pipeline Safety has entered into such an agreement and inspects pipeline operations for compliance with federal interstate liquid pipeline

regulations. OPS regulates, inspects, and enforces interstate liquid pipeline safety requirements in North Dakota and Wisconsin.

Each of the three states that would be crossed by the proposed pipeline has adopted a state "One-Call" system to reduce the potential for third-party damage to utilities during projects that involve excavations or soil borings.

4.13.1.3 Industry Standards

Design of the Alberta Clipper Pipeline would comply with pertinent industry standards, including, at a minimum, the following:

- American Society of Mechanical Engineers (ASME)/American National Standards Institute (ANSI) Code B31.4, "Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols." This standard addresses requirements for construction materials, welds, inspection, and testing for cross-country hazardous liquid pipelines. It requires a mainline block valve on the upstream side of major river crossings and public water supply reservoirs, and either a block valve or a check valve on the downstream side;
- American Petroleum Institute (API) 570 Piping Inspection Code, Inspection, Repair, Alteration, and Re-Rating of In-Service Piping Systems. This code was developed for the petroleum refining and chemical processing industries but may be used for any piping system;
- API Recommended Practice (RP) 1102, Recommended Practices for Liquid Petroleum Pipelines Crossing Railroads and Highways. This recommended practice is a requirement of ASME/ANSI B31.4;
- API RP 1109, Recommended Practice for Marking Liquid Petroleum Pipeline Facilities. ASME/ANSI B31.4 advises that API RP 1109 be used as a guide; and
- National Association of Corrosion Engineers RP 01-69, Control of External Corrosion on Underground or Submerged Metallic Piping Systems. ASME/ANSI B31.4 refers to sections of this recommended practice as a guide for an adequate level of cathodic protection.

4.13.2 Incident History

This section summarizes the incident history of hazardous liquid pipeline operations in the United States in the following sections:

- OPS Oil Pipeline Statistics (Section 4.13.2.1); and
- Enbridge Oil Pipeline Operating History in North Dakota, Minnesota, and Wisconsin (Section 4.13.2.2).

4.13.2.1 PHMSA/OPS Oil Pipeline Statistics

Spills are reported to OPS on standard forms, in accordance with 49 CFR Part 195.50. OPS maintains a database of pipeline incident reports on the PHMSA website; the database is available online at the following address: <http://primis.phmsa.dot.gov/comm/reports/safety/PSI.html >. Information presented in this EIS is based on data available on that site as of April 20, 2009. In this section, the term "hazardous liquid pipelines" is used for information based on hazardous liquid pipeline data.

Hazardous liquid pipeline incidents include those that are categorized as "serious" or "significant." As defined by OPS, "serious" hazardous liquid pipeline safety incidents are those involving a fatality or an injury requiring in-patient hospitalization. OPS defines "significant" incidents as those that meet any of the following conditions:

- A fatality or injury requiring in-patient hospitalization;
- $50,000 or more in total costs, measured in 1984 dollars;
- Releases of 5 barrels (210 gallons) or more of highly volatile liquid, or other liquid releases of 50 barrels (2,100 gallons) or more; or
- Liquid releases resulting in an unintentional fire or explosion.

As a result, significant incidents include all serious incidents.

The PHMSA website includes summary tables that provide overviews of serious and significant incidents reported over the last 21 years, through the end of 2008. Because the OPS data set for serious and significant releases is restricted to the reporting limit of 50 barrels (2,100 gallons) of spilled material, the data understate the actual number of incidents (i.e., omitting incidents of less than 50 barrels [2,100 gallons]) and overstate the average spill volumes.

Table 4.13.2-1 lists the national average number of "serious" incidents per year for hazardous liquid pipeline operators based on currently available information (PHMSA 2009). Those data show a decreasing trend in serious pipeline incidents. A total of 107 serious incidents were reported for the 21-year reporting period (1988 to 2008).

TABLE 4.13.2-1
Nationwide Hazardous Liquid Onshore Pipeline Systems, Annual Averages of Serious[a] Incidents (1988–2008)

Time Period	Serious Incidents per Year[b]
5-year average (2004–2008)	3
10-year average (1999–2008)	4
21-year average (1988–2008)	5

[a] A serious hazardous liquid pipeline safety incident involves a fatality or an injury requiring in-patient hospitalization.

[b] Rounded to nearest whole number.

Source: PHMSA 2009.

Table 4.13.2-2 lists the average annual number of significant incidents nationwide for all hazardous liquid pipeline operators from 1998 to 2008. Those data show a decreasing trend in annual incident frequency and injuries.

TABLE 4.13.2-2
Nationwide Hazardous Liquid Onshore Pipeline Systems
Annual Averages for Significant Incidents (1988–2008)[a]

Period	Number of Incidents	Fatalities	Injuries	Property Damage [b,c]	Gross Barrels Lost	Barrels Recovered	Net Barrels Lost
5-year average (2004–2008)	111	3	6	$78,076,419	112,587	48,453	64,134
10-year average (1999–2008)	118	2	7	$77,249,444	110,582	42,502	68,080
21-year average (1988–2008)	137	2	11	$63,179,164	133,933	60,478	73,456

[a] Significant incidents are those incidents reported by pipeline operators that meet any of the following conditions: (1) fatality or injury requiring in-patient hospitalization; (2) $50,000 or more in total costs, measured in 1984 dollars; (3) highly volatile liquid releases of five barrels or more, or other liquid releases of 50 barrels or more; or (4) liquid releases resulting in an unintentional fire or explosion. Significant incidents include all serious incidents. Numbers reported are rounded to nearest whole number.

[b] All costs prior to 2008 shown are in 2007 dollars. Costs listed were adjusted using the Bureau of Economic Analysis, Government Printing Office inflation values.

[c] For years 2002 and later, property damage was estimated as the sum of all public and private costs reported in the 30-day incident report. For years prior to 2002, accident report forms did not include a breakdown of public and private costs; therefore, property damage for those years is the reported total property damage filed in the report.

Source: PHMSA 2009.

Table 4.13.2-3 presents a summary of significant incidents by cause for hazardous liquid pipelines for the 21-year period from 1988 through 2008. There were three dominant causes for incidents during that period:

- Corrosion (23 percent);
- Excavation damage (21 percent);
- Material failure (20 percent); and
- Causes reported as "all other causes" (22 percent).

Intentional acts do not appear as a specific causal item in the PHMSA data. Terrorism has become a very real issue for energy infrastructure. The Department of Homeland Security has been involved with various federal agencies in developing a coordinated approach for protecting the energy facilities of the United States and continues to coordinate with the agencies to address this issue. However, for the purposes of this EIS, the term "accident" will be used to include those unintentional and those premeditated.

4.13.2.2 Enbridge Oil Pipeline Operating History in North Dakota, Minnesota, and Wisconsin

The Lakehead Pipeline System commenced operations in 1950. The operating company at that time was named Lakehead Pipeline Company, Inc. Later it was named Lakehead Pipeline, Limited Partnership; and it is currently named Enbridge Energy, Limited Partnership. The accident history presented in Table 4.13.2-4 is an 11-year history for crude oil spills attributable to Lakehead Pipeline Company, Inc.; Lakehead Pipeline, Limited Partnership; Enbridge Energy, Limited Partnership; and Enbridge Pipelines LLC (North Dakota). The accident history is for the states to be crossed by the proposed Project (North Dakota, Minnesota, and Wisconsin). Until 2002, operators of crude oil pipelines were required to report leaks of 50 barrels (2,100 gallons) or more. In 2002, the reporting requirement of 49 CFR 195.50 was reduced to spills of 5 gallons or more. However, as provided in 49 CFR 195.50 and 195.52, operators do not need to report releases of less than five barrels resulting from a pipeline maintenance activity if it is confined to company property (e.g., a pump station) or the pipeline right-of-way and is cleaned up promptly; is not considered a "significant spill" as defined in Section 4.13.2.1; and does not result in pollution of water bodies, cause discoloration or a sheen, or deposit sludge or emulsion beneath the surface of the water or on adjoining shorelines. In addition to OPS reporting requirements, agencies in the states crossed by the Alberta Clipper pipeline require that operators report any spill that threatens surface water or groundwater, or where there is a visible sheen.

Of the 1,425 crude oil spills reported for North Dakota, Minnesota, and Wisconsin in the PHMSA database between 1998 and 2008, about 10 percent were greater than 100,000 gallons (2,380 barrels). Five of the larger spills were reported in Minnesota, two were reported in Wisconsin, and one was reported in North Dakota. Most of the larger spills identified in Table 4.13.2-4 were on the Lakehead Pipeline or Enbridge system; however, that system is the largest pipeline network in North Dakota, Minnesota, and Wisconsin.

TABLE 4.13.2-3
Nationwide Onshore Hazardous Liquid Pipeline Systems Causes of Significant Incidents (1988–2008)[a]

Cause	Number of Incidents	Percent of Total Incidents (%)	Fatalities	Injuries	Property Damage[b, c]	Percent of Property Damage (%)
All other causes	652	22	21	97	$277,459,497	18.0
Corrosion	679	23	1	17	$287,231,375	18.6
Excavation damage	622	21	14	87	$188,420,911	12.2
Human error	207	7	6	27	$40,663,171	2.6
Material failure	586	20	0	4	$318,104,430	20.6
Natural force damage	102	3	0	1	$179,349,519	11.6
Other outside force damage	30	1	1	1	$35,533,552	2.3
Total	**2,878**	**97**	**43**	**234**	**$$1,326,762,455** [d]	**85.9** [e]

[a] Significant incidents are those incidents reported by pipeline operators that meet any of the following conditions: (1) fatality or injury requiring in-patient hospitalization; (2) $50,000 or more in total costs, measured in 1984 dollars; (3) highly volatile liquid releases of 5 barrels or more, or other liquid releases of 50 barrels or more; or (4) liquid releases resulting in an unintentional fire or explosion. Significant incidents include all serious incidents. Numbers reported are rounded to nearest whole number.

[b] The costs for incidents prior to 2008 are listed in 2007 dollars. Costs were adjusted using the Bureau of Economic Analysis, Government Printing Office inflation values.

[c] For years 2002 and later, property damage was estimated as the sum of all public and private costs reported in the 30-day incident report. For years prior to 2002, accident report forms did not include a breakdown of public and private costs; therefore, property damage for those years is the reported total property damage filed in the report

[d] Reported as $1,326,762,458 by PHMSA.

[e] Reported as 86.1 percent by PHMSA.

Source: PHMSA 2009.

TABLE 4.13.2-4 1998–2008 Enbridge Crude Oil Leak Incidents in Minnesota, Wisconsin, and North Dakota[a]									
Date	**City**	**County**	**State**	**Milepost**	**Product Spilled**	**Volume Spilled (barrels)**	**Volume Recovered (barrels)** [c]	**Primary Cause**	**Additional Detail/Notes**
9/16/1998			MN	878.1	Crude	5,700	5,415	Outside force	Damage by others
2/22/1999			MN	834.5	Crude	400	385	Other	Loose flange bolts
8/25/1999	Clearbrook	Clearwater	MN	Terminal	Crude	1	0	Other	Lockout failure [c]
11/15/1999		Taylor	WI	116.03	Crude	15	14	Other	Original construction
2/7/2000		Clearwater	MN	920.6	Crude	25	10	Failed weld	
2/23/2000		Cass	MN	957.1	Crude	10	5	Other	Pinhole leak
5/9/2000			MN	913.05	Crude	25	20	Other	Failed repair sleeve
7/22/2000		Clearwater	MN	914.1	Crude	50	10	Other	Failed repair sleeve
7/27/2000		Douglas	WI	1098.0	Crude	1,200	1,150	Other	Failed flange gasket [c]
1/25/2001		Clearwater	MN	918.7	Crude	25	10	Other	Failed sleeve
3/4/2001		Cass	MN	955.05	Crude	25	15	Failed weld	
2/14/2002	Cass Lake	Cass	MN	953.04	Crude	50	45	Excavation damage	By operator [c]
2/22/2002	Clearbrook	Clearwater	MN	909.1	Crude	50	50	Incorrect operation [c]	
7/4/2002	Cohasset	Itasca	MN	1002.7	Crude	6,000	2,574	Material failure	Pipe seam weld
11/4/2002	Floodwood	St. Louis	MN	1044.37	Crude	4	1	Failed weld [c]	
1/24/2003	Superior	Douglas	WI	1096.95	Crude	4,500	4,450	Failed weld [c]	Leak at terminal
4/14/2003	Trail	Polk	MN	892.95	Crude	125	75	Failed weld	Pinhole leak
5/26/2003	Clearbrook	Clearwater	MN	909.19	Crude	100	100	Joint [c]	
2/19/2004	Grand Rapids	Itasca	MN	1007.33	Crude	1,003	9	Natural forces	Earth movement
4/2/2004	Superior	Douglas	WI	1096.95	Crude	2	2	Equipment	Component [c]
5/13/2004	Superior	Douglas	WI	1096.95	Crude	40	38	Internal corrosion [c]	
5/20/2004	Clearbrook	Clearwater	MN	909.19	Crude	21	20	Failed weld [c]	
1/14/2005	Rio	Columbia	WI	268.82	Crude	3	3		
9/27/2005		Benson	ND	77.5	Crude	350	320	Excavation damage	Third party by others
12/22/2005	Arpin	Wood	WI	182.3	Crude	0.1	0.1	Failed weld	
1/1/2007	Owen	Clark	WI	149.17	Crude	1,500	1,450	Material failure	Pipe seam weld

TABLE 4.13.2-4 (continued)
1998–2008 Enbridge Crude Oil Leak Incidents in Minnesota, Wisconsin, and North Dakota[a]

Date	City	County	State	Milepost	Product Spilled	Volume Spilled (barrels)	Volume Recovered (barrels) [c]	Primary Cause	Additional Detail/Notes
1/25/2007	Stanley	Mountrail	ND		Crude	215	200	Incorrect operation	
2/2/2007	Exeland	Rusk	WI	84.9	Crude	3,000	2,534	Excavation damage	By operator
11/13/2007	Clearbrook	Clearwater	MN	912	Crude	2	2	Leak in weld	
11/24/2007	Maxbass	Bottineau	ND		Crude	84	84	Incorrect operation	
11/28/2007	Clearbrook	Clearwater	MN	912	Crude	325	0	Incorrect operation	Accident[d]
4/8/2008	Gonvick	Clearwater	MN	904.89	Crude	6	4.1	Equipment malfunction	

[a] Pipeline system leaks reportable to U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Reporting criteria for leaks were changed in 2002 from 50 barrels to 5 gallons.

[b] Initial volume recovered is the free oil and drain-up from pipe with special vacuum equipment and typically returned to the pipeline system. Remaining product in soil is recovered by removing soils or other approved methods.

[c] Release occurred within a pump station/terminal.

[d] The accident resulted in the release of crude oil and a fire and explosion that caused the deaths of two Enbridge employees.

Sources: PHMSA 2009; Enbridge 2007, 2009.

As identified in Table 4.13.2-4, the largest Enbridge spill in the Project area within the past decade was the Cohasset spill on July 4, 2002. The crude oil spill was caused by a pipe failure, which resulted in approximately 6,000 barrels of crude oil being unexpectedly released into a peat wetland. Emergency response efforts were initiated the same day as the release and focused on containment and recovery of the oil.

The spilled oil was contained primarily by constructing earthen berms around the spilled oil to contain it, although some areas also were protected by booms. Those actions prevented the oil from migrating into an adjacent creek that flows to the headwaters of the Mississippi. Shortly after the spill occurred, the federal and state agencies involved as Trustees for the Environment agreed to an *in-situ* burn as a response measure to remove a portion of the oil.

As a result, the impacted wetland area was limited to approximately 11 acres due to oil and response activities. Approximately 90 percent of the released oil was recovered from the marsh, and over 16,000 tons of oiled peat, vegetation, and response materials were recovered and removed for proper disposal. Remediation efforts also included reestablishment of natural contours and vegetation, controlling invasive plant species, and import of clean peat material. State regulators determined that cleanup was complete in 2006.

In addition, Enbridge, as the responsible party, was required under federal law to compensate the public for environmental impacts as part of a Natural Resource Damage Assessment performed cooperatively with FWS, MDNR, MPCA, LLBO, and Enbridge. Restoration plans were developed in coordination with federal, state, and tribal resource agencies and funded by Enbridge. The approved plans include the restoration of a 30-acre wetland in the CNF, and the retrofitting of school buses in the Cass Lake School District to offset emissions due to the *in-situ* burning of the oil. Final settlement of the natural resource

damage claim was signed by the participating agencies and Enbridge in January 2009. Monitoring of the wetland restoration project is ongoing, and the funding for the retrofitting is expected to occur in 2009.

4.13.3 Risk Assessment

This section presents a summary of the potential for oil spills from the proposed Project in the following subsections:

- Construction Spills (Section 4.13.3.1);
- Operations Spills (Section 4.13.3.2); and
- Spill Frequency and Volume (Section 4.13.3.3).

4.13.3.1 Construction Spills

The majority of construction spills tend to be relatively small and consist of refined products (such as gasoline, diesel, and lubricating and hydraulic fluids) and most result from vehicle and construction equipment fueling and maintenance in construction staging areas or along the construction right-of-way. Tanker truck accidents or fuel storage tank failures are the most likely source of relatively large construction spills. Fueling operations can be a source of frequent but small spills. Construction staging areas may include portable fuel and oil tanker trucks, although Enbridge has proposed to conduct refueling activities only along the construction right-of-way and 100 feet from all wetlands and waterbodies, where possible. The potential oil spill volume from these sources would be small relative to the potential spill volume from a pipeline incident. Enbridge's preventative and mitigating measures regarding potential spills from construction activities are described in Section 4.13.6 and in its SPCC Plan (Appendix E).

A commenter noted that, during construction of the Alberta Clipper pipeline, it is possible that an existing pipeline in the adjacent corridor could be damaged and release oil. Enbridge is aware of the locations of the alignments of each of its existing pipelines; the pre-construction survey crews would mark the locations of the nearest existing pipelines in the field to alert construction crews of their presence. In addition, the new Alberta Clipper pipeline trench would be at least 25 feet from the nearest pipeline. As a result, it is unlikely that the existing pipelines would be damaged during construction of the Alberta Clipper pipeline. However, if a release were to occur due to such damage, Enbridge would follow the procedures included in its existing ERP for the existing pipelines (see Sections 2.6.5.1 and 4.13.6.4).

4.13.3.2 Operations Spills

Spills from the proposed pipeline or the associated pump stations, valves, or pigging facilities could occur during operation. The spill volume could range from relatively small leaks or drips to a very large spill due to a rupture of the pipeline, and spills could occur anywhere along the pipeline alignment. Releases from oil pipelines can occur due to corrosion, damage caused by third parties performing excavation or soil borings, external forces due to landslides or scour, human error, and other causes. Pump station leaks can occur from causes similar to those that create pipeline leaks as well as due to activities conducted during maintenance or as a result of improperly conducted maintenance.

As described in Sections 2.6.4 and 4.13.6, the Alberta Clipper Project would be added to Enbridge's existing Supervisory Control and Data Acquisition (SCADA) system and its system for small leak detection to identify losses from the pipeline system. Although pipeline leak detection technology is intended to identify a leak and shut down flow quickly, actual response with containment equipment and cleanup crews may not be immediate for several reasons, such as the following:

- The exact leak location may not be initially known;
- Snow or other factors may hinder visual detection;
- The leak may be remote from response capabilities; and
- A report of the leak may not be immediate.

4.13.3.3 Spill Frequency and Volume

The risk associated with oil spills is expressed as a combination of spill frequency and spill volume, and is assessed using failure frequencies derived from general hazardous liquid pipeline operating history. The general incident frequencies and spill volumes were reviewed for relevance to the proposed Project. Spill volume is further addressed in Section 4.13.4.1.

As part of the NEPA environmental review, a frequency-volume analysis was performed using PHMSA data specific to the states that would be crossed by the proposed pipeline. For spills or leaks greater than 50 barrels, the spill frequencies and volumes estimated from PHMSA data and applied to the proposed pipeline are presented in Table 4.13.3-1. The frequency factors indicate an overall frequency of between about 0.1 and 0.3 spills per year, depending on which data set is used as the basis for the estimate.

TABLE 4.13.3-1
Projected Spill Incidents (>50 Barrels) per Year for the Proposed Alberta Clipper Project

Spill Incidents per Year	Full PHMSA Hazardous Liquids Data Set[a]	PHMSA Data for Project States[b]	PHMSA Data for Crude Oil[c]
Incidents per mile per year	0.00080	0.00033	0.00077
Project incidents per year (326.9 miles)	**0.26**	**0.11**	**0.25**

[a] PHMSA = Pipeline and Hazardous Materials Safety Administration. Data set includes all hazardous liquid pipelines in the United States, onshore and offshore.
[b] Data set includes data only for hazardous liquid pipelines in North Dakota, Minnesota, and Wisconsin.
[c] Data set includes data only for crude oil pipeline incidents, all states.

Sources: PHMSA 2009, BTS 2009b.

For purposes of the risk and impact assessment of the Alberta Clipper Project, a reasonable generalization is that small spills are likely to occur and very large spills are highly unlikely to occur (see Section 4.13.4.1 for a definition of spill size categories). Although large to very large spills are highly unlikely to occur, they have occurred in the past (as indicated by the PHMSA data and the Enbridge spill history data); therefore, the potential impacts of such events were considered in the analysis of potential spill impacts presented in this section.

4.13.4 Oil Spill Behavior and General Types of Impacts

Crude oil released into the environment (spills) may affect natural resources, human uses and services, and aesthetics to varying degrees, depending on the cause, size, type, volume, rate, temperature of the oil, location, season, environmental conditions, weather, and associated response actions. Small oil spills (such as intermittent leaks and drips from construction machinery and operating equipment) are likely to occur during construction and operation of the proposed Project. There is also the possibility for a spill of sufficient magnitude to substantially affect natural resources and human uses of the environment. This

section summarizes impacts from a range of potential oil spill scenarios associated with the proposed Project.

Oil spills are typically unpredictable in cause, location, time of occurrence, size, and duration (Hart Associates 2000). The potential occurrence of oil spills can be assessed by analyzing the risk of spills based on historical operation of pipeline systems. When an oil spill occurs, the resulting environmental impact depends on a number of factors, including:

- Fate and behavior of the spilled oil (i.e., potential for a spill reaching an environmental receptor);
- Concentration and chemical composition of the oil;
- Duration of exposure; and
- Toxicity (hazard) of the oil to the receptor.

There is a wide range of potential events, environmental variables, and oil release variables associated with oil spills. Therefore, assessments of potential oil spill impacts require a selection of reasonable hypothetical spill scenarios and environmental variables that are necessarily simplified and do not represent the entire spectrum of possible values or combinations of values and events that can occur. The following sections discuss the selected spill scenarios, environmental variables, and impact assessments associated with those scenarios:

- Factors Affecting Oil Spill Impacts (Section 4.13.4.1);
- Types of Spill Impacts (Section 4.13.4.2);
- Spill Scenarios (Section 4.13.4.3); and
- Assessment of Impact Magnitude (Section 4.13.4.4).

4.13.4.1 Factors Affecting Oil Spill Impacts

Impacts related to oil spills can be affected by a wide variety of factors. The following key factors are addressed below:

- Location of spill;
- Substance and volume spilled;
- Habitat, natural resource, and human use receptors;
- Season;
- Weather and water levels; and
- Enbridge response time.

Location of Spill

Most spills would occur and be contained within, or in close association with, the pipeline right-of-way or the associated infrastructure, such as construction yards, pump stations, and maintenance yards. During construction, refined product spills also could occur from incidents such as tank truck accidents along roads leading to the construction sites. These spills typically would be small and would be promptly cleaned up as required by federal, state, and local regulations before they reached offsite lands or

waterbodies. Some spills from vehicles, including tank truck accidents, could result in much or all of a load being spilled to the land, wetlands, ponds, lakes, or flowing waterbodies adjacent to the road, construction right-of-way, or work areas.

Based on the pipeline spill database, operational spills from the pipeline system itself would be more likely in areas where subsurface excavations are more frequent and in areas where corrosion potential is relatively high.

Substance and Volume Spilled

For the proposed Project, the materials that could be released during construction or operation include the following:

- Crude oil, potentially including corrosion inhibitors, scale inhibitors, or drag-reducing agents;
- Refined oil (diesel, gasoline, hydraulic fluid, transmission oil, lubricating oil and grease, waste oil, mineral oil, solvents, and other petroleum-based products); and
- Other potential hazardous materials such as methanol, antifreeze, water-soluble chemicals, corrosion inhibitors, scale inhibitors, drag-reducing agents, or biocides.

For the purposes of the analysis of spill impacts, potential spill volumes were categorized to generally follow the unofficial categories used by OPS for spill reporting. The categories consist of the following:

- Very small spills: less than 5 barrels (less than 210 gallons);
- Small spills: from 5 barrels (210 gallons) to less than 50 barrels (2,100 gallons);
- Significant spills: from 50 barrels (2,100 gallons) to less than 500 barrels (21,000 gallons);
- Large spills: from 500 barrels (21,000 gallons to less than 5,000 barrels (210,000 gallons); and
- Very large spills: greater than 5,000 barrels (210,000 gallons).

Habitat, Natural Resources, and Human Use Receptors

The impact of an oil spill would be heavily influenced by the types of receptors (i.e., habitats, natural resources, and human uses) exposed to the oil. Key sensitive receptor categories, listed in order of increasing perceived sensitivity to an oil spill, include the following:

- Terrestrial-agricultural land: grazing, field and row crops, fallow fields, and similar land uses;
- Terrestrial-natural habitat: native and second-growth forests, naturally restoring grasslands, and similar areas that are not being used directly by people;
- Groundwater: areas where the water table is close to the surface and is overlain by soils permeable to oil or karst formations;
- Aquatic-wetland habitat: all areas that meet the definition of wetlands;
- Aquatic-lake/pond habitat: agricultural stock ponds, small and large lakes, reservoirs, and similar non-flowing waterbodies;

- Aquatic-stream/small river habitat: smaller flowing waterbodies and those that are intermittent or ephemeral;
- Aquatic-large river habitat: large flowing waterbodies that are perennial, support commercial traffic, and may be restricted by dams and major reservoirs;
- Threatened and endangered species and their critical habitat: a special case of resources that may be found in any of the habitats but are limited in population size or spatial distribution;
- Human use-residential: areas where the pipeline right-of-way is near rural, suburban, or urban populations;
- Human use-commercial: areas (especially large rivers) that may be closed to normal use during a spill response action and result in substantial economic impacts;
- Human use-recreational: areas (especially lakes, small and large rivers, and reservoirs and associated parks) used by people for various recreational activities; and
- Human use-water intakes: usually in reservoirs, large rivers, and some groundwater aquifers from which drinking water, industrial cooling water, or agricultural water supplies are obtained.

Season

The season in which a spill occurs could dramatically influence its behavior and the resulting impacts and cleanup response actions. Seasonal effects are described below for two general seasons: spring through fall and winter.

The duration of the spring-fall season depends on the specific location and the weather regime of the year. In this analysis, the season generally is defined as the period when the ground is free of snow and access to the pipeline right-of-way is not restricted by snow and ice. Most of the rivers and creeks are flowing; ponds, lakes, and reservoirs are open water; and biological use of land and waterbodies is high. With these conditions, currents, winds, and passive spreading forces would disperse spills that reach the waterbodies. Spills to land would directly affect the vegetation, although dispersal of the spilled material is likely to be impeded by the vegetation. Spills to wetlands may float on the water or could be dispersed over a larger area than would spills to dry land or to snow-covered land.

In winter, waterbodies may be covered with ice, and snow may partially to completely cover the land surface. Under these conditions, dispersal of material spilled on land generally would be slowed, although not necessarily stopped. Depending on the depth of snow cover, as well as the temperature and volume of spilled material, the spill may reach the underlying dormant vegetation or wetlands, ponds, and lakes. Similarly, spills to flowing rivers and creeks generally would be restricted in areal distribution by the snow and ice covering the waterbody, compared to seasons with little or no snow and ice cover. Spills under the ice in creeks, rivers, and ponds/lakes might disperse slowly as the currents are generally slow to non-existent in winter. Also, because of the snow and ice, winter spills may be harder to detect, and when found may be more difficult to contain and clean up. In ice-covered waters, many of the same weathering processes occur as in open water; however, the ice would change the rates and relative importance of these processes (Payne et al. 1991).

Spring melt is the short transition period between winter and spring when thawing begins and river flows increase substantially and quickly, often to flood stages. Major floods could cause bank erosion, and any released oil entering a river could be widely dispersed and difficult to contain or clean up.

Weather and Water Levels

Weather, especially rapid warming periods and heavy rainfall, may cause snowmelt and runoff that could result in major flood flows in the larger rivers. Some major flood flows may be great enough to breech levees and erode river banks and channels, potentially exposing the Alberta Clipper pipeline to structural forces. If oil is released to the flooded area, especially to flowing waters, it could be distributed to adjacent terrestrial, wetland, and aquatic habitats.

High wind velocity may result in widespread distribution of any material released to the air under pressure. Major flooding or adverse weather conditions (such as high winds, tornadoes, blizzards, and extreme cold) also may limit the ability to detect a suspected release, as well as hinder or stop the spill response contractors from implementing oil spill containment and cleanup operations.

Enbridge Response Time and Actions

Actions taken by Enbridge and federal, state, tribal, and local agencies would influence the impact of a spill. In addition to the design and safety standards to be incorporated into the Project (see Sections 4.13.1, 2.2.2, and 2.2.3), Enbridge has several existing systems in place designed to prevent spills that would be expanded to include the Alberta Clipper Project, including a public awareness program (Section 2.6.1.5) and a maintenance program (Section 2.6.2).

Enbridge also has systems in place designed to detect releases and respond to them if they occur. Those systems would be expanded to include the proposed Project and include the following:

- Right-of-Way Inspections and Monitoring (Section 2.6.1.2);
- Operations Monitoring (including SCADA and a small release detection system) (Section 2.6.4); and
- Emergency Response Plan (Sections 2.6.5.1 and 4.13.6.4).

4.13.4.2 Types of Spill Impacts

Oil spills can result in physical, chemical or toxicological, and biological impacts. Impacts of oil spills to natural resources and human uses generally result from physical coating or chemical exposure of soils, sediments, plants, animals, or areas used by people. Typical impacts associated with oil spills include the following:

- Smothering living organisms so they cannot feed or obtain oxygen;
- Coating feathers or fur, which reduces their insulating efficiency and results in hypothermia;
- Adding weight to the organism so that it cannot move naturally or maintain balance;
- Coating sediments and soils, which reduces water and gas (such as oxygen and carbon dioxide) exchange and affects subterranean organisms;
- Coating beaches, water surfaces, and other places used by people;
- Coating or contaminating existing infrastructure, such as buried waterlines in the spill zone; and
- Acute or chronic effects on the biological processes of individual organisms.

4.13.4.3 Spill Scenarios

It is impractical to evaluate all possible oil spill scenarios due to the large number of variables associated with a potential oil spill. As noted above, spills that may result in significant environmental impacts are likely to be crude oil releases from the proposed pipeline; therefore, we developed pipeline spill scenarios based on the spill volumes listed below to identify the key potential impacts of a spill. These scenarios are described below, and the associated impact analyses are presented in Section 4.13.5.

Very Small and Small Spills

The most common spill scenarios are the very small (less than 5 barrels) and small (5 to 49.9 barrels) spills of diesel, hydraulic fluid, transmission oil, and antifreeze on roads, the right-of-way, or work areas. Small spills also may result from slow and small leaks of crude oil from the pipeline (also known as "pinhole leaks").

Most of these small spills would occur on the right-of-way or at Project-related facilities and would likely not reach non-Project land or waterbodies. However, some small releases could reach natural or cultivated land or could seep into the soil toward groundwater or into nearby waterbodies remote from roads. Small spills reaching terrestrial habitats typically would affect a limited area adjacent to the road, right-of-way, or work areas. Even the small spills that reached waterbodies generally would result in a limited impact because of the small volume involved. The majority of the pipeline route would be through upland areas.

Significant and Large Spills

Significant spills (50 to 499.9 barrels) and large spills (500 to 5,000 barrels) would be much less common than very small or small spills. Significant spills are more likely to (1) be caused by accidents at construction and operation/maintenance sites; and (2) occur on or near roads, facility sites, or along the right-of-way. The actual volumes released would depend on key factors such as the location of the release, the locations of and activation methods for valves, pressure in the line, and topography.

Significant spills are likely to result from tanker truck accidents (during construction), outside forces such as excavators and major earth movement, or corrosion of the pipe. Large spills are more likely to be crude oil releases from the pipeline and typically would occur in the right-of-way. Significant and large spills are more likely than small ones to reach natural or agricultural lands and waterbodies adjacent to the right-of-way and roads. For spills that reach waterbodies, especially flowing streams and rivers, the area of impact generally would be more extensive than for the small spills because of the larger volume of oil involved. Likewise, the potential for large spills to reach groundwater is greater than for small spills. Large spills that result from a rupture in the pipeline are likely to be detected quickly by the SCADA system; both automatic and manual responses would be quickly activated to stop and isolate the leak.

Very Large Spills

Very large (greater than 5,000 barrels) spills are highly unlikely but possible events. If one occurred, it would likely result from a major rupture or a complete break in the pipeline that would release crude oil at some point along the right-of-way. Causes could include corrosion; major earth movement resulting from slides, earthquakes, or flood flows eroding river banks at non-HDD crossings; mechanical damage from excavation work; or vandalism or terrorist actions. As for significant and large spills, the actual volumes released would depend on key factors such as the location of the release, the locations of and activation methods for valves, pressure in the line, topography, and response actions.

Very large spills are more likely than smaller spills to spread to adjacent areas including upland and aquatic areas, especially if they occur in the ice-free seasons. The proximity of the pipeline to major streams and rivers may be the most important factor in the spill scenarios. In general, if the spilled material flows only to dry land, the oil probably would not disperse very far. Crude oil is viscous and would percolate downward slowly. A substantial portion of crude oil may adhere to soil particles, thereby reducing the amount that could reach the groundwater. Once at the upper groundwater surface, most crude oil would float and may move downgradient with the groundwater. If a very large spill reaches a flowing creek or river, the oil could be dispersed for substantial distances downstream. In flood flows, the oil also could be distributed over the flooded natural, agricultural, or residential/commercial lands and could flow into ponds, reservoirs, and lakes. Whether a very large spill would reach these rivers or streams would depend on several variables, including the type, temperature, and volume of oil spilled; the topographic relief and slope; air temperature; presence of snow or vegetation; and response time and actions.

4.13.4.4 Assessment of Impact Magnitude

Based on the worldwide literature accumulated over the past 50 years on oil spill impacts to ecosystems and human uses (such as NRC 1985, 2003a, and 2003b), the magnitude of impact is primarily a function of the size of the spill, type of oil, and sensitivity of the receptors affected. For the proposed Project, the crude oil stream represents the most likely source of an oil release that could produce a significant environmental impact. The size of a spill and the receptor types therefore would be key variables for estimating the magnitude of potential environmental impacts from a spill. The volume of the spill is an objective variable that can be determined or estimated within a reasonable margin of error in most cases. Receptor sensitivity, however, is more subjective and is markedly influenced by the perspectives and biases of the evaluators. The relative sensitivities of receptors that could be affected by the proposed Project are presented as a hierarchy in Table 4.13.4-1 based on historical spill sensitivity assessments and typical stakeholder input.

The magnitude of environmental impacts generally increases within a receptor type as spill size increases (from left to right in the table). Within a spill size, the magnitude of impact increases with increasing sensitivity of the receptors (from top to bottom in the table). Combining size and sensitivity, the magnitude of impacts generally increases from top left to bottom right in the table.

4.13.5 Resource-Specific Impacts

This section summarizes potential impacts on specific resources that could result from oil spills and releases from the Project.

TABLE 4.13.4-1
Significance of Environmental Impacts of Crude Oil Spills with Increasing Spill Size and Increasing Sensitivity of Receptors

Type Of Receptor [a]	Magnitude of Impact by Size of Spill[b]				
	Very Small (<5 bbl)	**Small (5–49.9 bbl)**	**Significant (50–499.9 bbl)**	**Large (500–5,000 bbl)**	**Very Large (>5,000 bbl)**
Terrestrial-agricultural land	Negligible	Negligible to minor	Minor to substantial	Minor to substantial	Substantial
Terrestrial-natural habitat	Negligible	Minor	Minor to substantial	Substantial	Substantial
Groundwater	Negligible	Negligible	Negligible to minor	Minor to substantial	Substantial
Aquatic-wetlands	Negligible	Minor	Minor to substantial	Substantial	Major to catastrophic
Aquatic-lakes and ponds	Negligible	Negligible to minor	Minor to substantial	Substantial	Major
Aquatic-streams and small rivers	Negligible	Negligible to minor	Substantial	Major	Major to catastrophic
Aquatic-large rivers	Negligible	Negligible	Minor	Substantial to major	Major to catastrophic
Threatened and endangered species and habitat	Negligible to substantial	Minor to substantial	Substantial	Substantial to major	Major to catastrophic
Human use-commercial	Negligible	Negligible to minor	Minor	Minor to substantial	Substantial to major
Human use-residential	Negligible	Negligible to minor	Minor	Minor to substantial	Substantial to major
Human use-recreational	Negligible	Negligible to minor	Minor to substantial	Substantial to major	Major to catastrophic
Human use- water intakes	Negligible to minor	Negligible to minor	Minor	Minor to major	Major to catastrophic

[a] In increasing order of sensitivity from top to bottom.

[b] Negligible impact: little to no detectable impact on most resources; maybe some visible presence of oil on land, vegetation, or water. No to very few organisms apparently killed or injured. Temporary (days) and very local to spill site.

Minor impact: measurable presence of oil and limited impacts on local habitats and organisms. Temporary (days to weeks) and local (acres). Some organisms (likely birds, fish, and aquatic macroinvertebrates) may be killed or injured in the immediate area.

Substantial impact: patchy to continuous presence of oil on terrestrial and aquatic habitats near the spill site. Impacts may be present for weeks to a few months and may affect tens of acres or a few miles of stream/river habitat. Local community- and population-level effects on organisms and human uses of the area.

Major impact: patchy to continuous and heavy presence of oil on terrestrial and aquatic habitats near the spill site and for substantial distances downgradient of the spill site. Impacts may be present for weeks to months and potentially for a year or more. Area may include many acres to sections of land or wetlands and several miles of riverine habitat. Local community- and population-level impacts on organisms and habitats, and disruption of human uses of local oiled areas.

Catastrophic impact: mostly continuous or nearly continuous presence of oil on all habitats near and for substantial distances downgradient of the spill site. Impacts may be present for months to years. Area may include many acres to sections of land or wetlands, and several to numerous miles of river or other aquatic habitat. May cause local and regional disruption of human uses. May cause local and regional impacts to biological populations and communities.

4.13.5.1 Geology

Oil spills or releases are not expected to result in impacts to general geological features. In addition, no geological features that have received federal or state protection are present within the Project right-of-way or adjacent areas.

Paleontological Resources

Historically, most spills are relatively small and typically are confined to a construction site, access roadway, pipeline right-of-way, or an adjacent area. The primary exceptions are large to very large spills from pipelines that affect areas beyond the right-of-way. For example, a large spill may enter an adjacent waterbody, and oil may be carried for several miles downstream. There are no known areas of sensitive paleontological resources within the proposed pipeline work area. However, glacial deposits similar to those being crossed by the proposed route may contain fossils of mastodon, mammoth, horses, and Pleistocene vertebrates (Paleontology Portal No Date), including those located downstream from the proposed route. Vertebrate fossils are relatively rare, and locations containing these fossils are more likely to be scientifically significant than those containing invertebrate or plant fossils. In areas where bedrock is exposed, fossils may be present, especially in sedimentary rocks from the Cretaceous period. The upper Cretaceous bedrock outcrops may contain fossils of marine organisms, including turtles, fish, ammonites, and various invertebrates.

Because no areas of known sensitive paleontological resources occur in the immediate vicinity of the Alberta Clipper pipeline right-of-way and there is very little shallow bedrock along the proposed route, the likelihood of impacts to these resources from an oil spill is remote.

Mineral Resources

Mineral resources in North Dakota, Minnesota, and Wisconsin include industrial (e.g., sand, gravel, and crushed stone) and metallic (e.g., iron ore, nickel, and titanium) minerals. Table 4.1.1-2 identifies mining and mineral resources areas within 1,500 feet of the pipeline route. Glacial deposits in the area of the proposed pipeline range from 5 to 450 feet in depth. These deposits represent a potentially valuable source of industrial (sand and gravel) minerals. All of the localities listed are associated with non-metallic resources and include four gravel pits and six sand/gravel pits.

The proposed route does not cross any active surface mines or quarries, but potentially valuable sand and gravel resources that traverse glacial deposits lie within 150 feet of the proposed Alberta Clipper pipeline right-of-way for approximately 150 miles from Beltrami County to Carlton County in Minnesota. As discussed in preceding sections, impacts from spills vary with the type of oil, volume, site features (such as topography), season, hydrologic factors (such as spread by surface waters), degradation (such as volatilization), and the type and distribution of resources present. For surface and near-surface resources such as sand and gravel, spills may result in localized reduction in resource availability and value, depending on actions involved in the incident response and subsequent remedial activities. For large and very large spills, the impacts may be proportionally greater. However, the distribution of these mineral resources and their relatively undeveloped state along the right-of-way indicate that the overall potential for impacts to the resources and their associated industries is small.

4.13.5.2 Soils

The impact of oil spills on soil is a function of several variables, including the type of oil, permeability of the soil, type and amount of vegetation and other surface cover, and the release point (such as on the surface, or below ground). Crude oil, lubricating oil, and similar heavy oils would be less likely to

penetrate through the surface soil layers than refined oil (such as gasoline and diesel), which could infiltrate through the vegetation, debris, and litter cover.

Once the oil reaches the soil surface, the depth of penetration into the soil would depend on the volume released, the viscosity of the spilled oil, the porosity of the soil, and the extent to which the soil is frozen or, during warmer seasons, saturated with water. Porous soils (such as sand, gravel, and moraines) are generally more permeable than clays and silts, especially if the latter are saturated. Karst areas may be especially vulnerable to impacts from a spill.

Spill cleanup is more likely to affect the soils than the presence of the spilled material itself, unless the cleanup is well controlled and heavy traffic and digging are minimized (especially for spills in summer).

Sediments in wetlands and aquatic habitats are typically fine grained and saturated with water. The sediment may be coarser grained in fast-flowing streams and rivers, and in areas where glacial moraines dominate the soil types. Crude or refined oils typically do not penetrate beyond the surface layer in sediments unless (1) there is a substantial amount of turbulence that mixes the oil and sediments, followed by deposition of the mixture in low-energy areas; (2) the interstitial spaces are large enough (such as in gravel and coarse sand) to allow penetration of the oil as it sinks; or (3) physical activities associated with spill response actions mix the surface-deposited oil-sediment mixture into deeper subsurface levels of the sediment profile. Refined products also typically would not penetrate sediments because of their water content but may penetrate or be mixed further into the sediments under the same turbulent or cleanup actions as described for crude oil.

For releases with greater potential impacts, Enbridge would be required by the appropriate federal, state, and/or tribal agencies to prepare a soil and groundwater monitoring plan for approval. Remediation would be designed to prevent migration of the oil and would be developed with particular attention to and sensitivity posed by the specific soil types, groundwater flows, drinking water sources, and environmental receptors. Investigation and cleanup efforts would continue according to the approved plan until the relevant federal and state environmental agencies state in writing that the cleanup efforts have been completed. The cleanup efforts would be conducted with oversight by the agencies.

4.13.5.3 Water Resources

Surface Water

Minor and temporary to short-term surface water quality degradation is possible due to spills or leaks from maintenance equipment and vehicles. During construction activities, refueling would be conducted at least 100 feet away from all surface waterbodies as required by Enbridge's state-specific EMPs (Appendix C). In the event that channel migration or streambed degradation threatened to expose the pipeline, protective activities such as reburial or bank armoring are likely to be implemented. All water crossing designs would be reviewed by the COE prior to the issuance of construction permits; the designs of the crossings would specify the appropriate stabilization and restoration measures.

Control valves would be installed on both sides of larger perennial streams for the proposed Project (see Table 2.2.3-1). In the event of a crude oil release, the valves and enactment of Enbridge's ERP (Section 2.6.5.1) would reduce the effect of oil on surface water resources.

Depending on proximity, a large spill could affect drinking water sources and irrigation water supplies. Enbridge has an approved ERP for its existing pipeline system that identifies measures to minimize the likelihood of a spill and control the extent of a spill if one were to occur. As noted in Sections 2.6.5.1 and 4.13.6.4, Enbridge would expand the existing ERP to include the Alberta Clipper Project and submit it to

OPS for review and approval. Implementation of the procedures in Enbridge's ERP would reduce the potential for spills and leaks to affect surface water resources.

Groundwater

In the region of the proposed Project route, groundwater is the primary source of drinking water for the municipal population and essentially the only source for the rural population. The proposed Project route does not cross any aquifers designated as sole source aquifers by EPA Regions 5 and 8 (EPA 2007). Additional information on groundwater aquifers in proximity to the Project is presented in Section 4.3.1.1.

Larger spills may reach groundwater if the overlying soils are porous and not water saturated, and if the water table is relatively near the surface. Diesel fuel has low viscosity when spilled and tends to percolate downward toward the water table. If it reaches the groundwater table, it floats on the water and may move downgradient with the groundwater, although potentially at a lower rate than the groundwater. Impacts may be greater if the volume was relatively large (such as a tanker truck accident) and the groundwater is at a relatively shallow. Some of the diesel fuel could become dispersed in the groundwater, contaminating the groundwater for agricultural or domestic drinking supply uses.

Compared to diesel fuel, crude oil is more viscous and would percolate downward more slowly. Also, a substantial portion of the crude oil may adhere to the soil particles, thereby reducing the amount that reaches the groundwater. If the crude oil reaches the upper groundwater surface, most of it would float and may move downgradient with the groundwater, although probably more slowly than the groundwater. The oil also would undergo some biodegradation, attach (adsorb) to soil particles, and disperse into the water—all of which would result in natural attenuation of the contamination. Like diesel fuel, crude oil may impact agricultural or domestic uses of the groundwater and may contaminate surface waterbodies if the contaminated groundwater discharges into those waters.

Overall, it is not anticipated that groundwater quality would be affected by spills or leaks during construction activities. Many of the aquifers present in the subsurface beneath the proposed route are isolated by the presence of glacial till, which characteristically inhibits downward migration of water and contaminants into these aquifers. However, some shallow or near-surface aquifers are present beneath the proposed route. Tanker trucks would be used to refuel construction equipment. To prevent releases, fuel tanks or fuel trailers would be placed within secondary containment structures equipped with impervious membrane liners as required by the Enbridge state-specific EMPs (Appendix C). Implementation of procedures presented in Enbridge's SPCC Plan (Appendix E) would ensure that (1) contractors would be prepared to respond to any spill incident; and (2) contaminants would be contained and not allowed to migrate into the aquifer during construction activities, regardless of the depth of the underlying aquifer.

During the life of the proposed Project, routine operation and maintenance is not expected to affect groundwater resources; however, if a crude oil release occurred, oil could migrate into subsurface aquifers and into areas where these aquifers are used for water supplies. The measures and actions that would be implemented in the event of a spill or release from the Project are identified in Section 4.13.6.

As noted in Section 4.13.5.2, if a release occurs, Enbridge would be required to prepare a soil and groundwater monitoring plan subject to approval of the appropriate federal, state, and tribal agencies—dependent on the level of impact of the spill. Remediation would be designed to prevent migration of the oil or risk to drinking water, agricultural water supply sources, or environmental receptors. The plan would be developed with particular attention to and sensitivity posed by groundwater flows, drinking water sources, and other environmental receptors. Investigation and cleanup efforts would continue according to the approved plan until the relevant federal and state environmental agencies state in writing

that the cleanup efforts have been completed. The cleanup efforts would be conducted with oversight by the agencies.

4.13.5.4 Biological Resources

Wetlands

Potential impacts of spills to wetlands are influenced primarily by the type of oil, the amount and proportion of water surface area covered, the type of vegetation present in the wetland, and cleanup response actions. Refined products tend to be more toxic than crude oil, while crude oil tends to cause more physical impacts (such as smothering). The slick of refined product may result in toxic components being dissolved and dispersed in the underlying water column. Dense stands of emergent vegetation tend to act like an oil boom and collect oil at the edges of the stand because the oil adheres to the vegetation. As noted above, crude oil tends to infiltrate the vegetation stands less than refined products because the crude oil is more viscous. Aggressive and intrusive cleanup methods tend to mix the oil into the water and especially the sediments (which are often anoxic below the surface layer) where the oil may have long-lasting effects. Such cleanup methods may directly affect the vegetation, sediments, and animals more than the spilled oil. Passive cleanup methods, especially natural attenuation and biodegradation processes, generally result in much less impact to wetland resources. As a result, passive cleanup techniques are becoming more prevalent for oil spills in wetlands.

Small spills of refined product (such as diesel or gasoline) that affect wetlands would be more likely to occur during construction and are more likely to be very-small to small-volume spills from construction areas or from access roads. If a spill occurs in winter, the wetland may be covered in ice; the spilled product may be contained by snow and remain on top of the ice. In either case, it could be recovered before it directly affected the wetland habitat and associated vegetation or animals. For spills occurring during the rest of the year, most of the product would float on the water or wet soil surface—although some of the volatile fraction may dissolve or disperse in the water. Although gasoline spills evaporate quickly, they may cause a short-term acute toxicological effect on animals in the wetland; and the vegetation may be chemically "burned" from the water line up. Diesel spills tend to be more persistent than gas spills and the oil may become incorporated into the sediments as well as adhere to the emergent vegetation.

Accidental releases of crude oil would occur only during operation. The locations of crude oil releases that could affect wetlands would be primarily within the permanent right-of-way where the pipeline crosses wetlands or waterbodies such as ponds, lakes, reservoirs, streams, rivers, or adjacent areas upgradient from these habitats. Spills that occur in winter may be restricted in the area affected because the low temperatures and the presence of snow would increase the oil viscosity. In warmer seasons, large to very large spills of crude oil may flow into wetlands, where oil would cover the water surface, coat plants and animals, and restrict oxygen exchange between air and water. Some of the crude oil may sink, become incorporated into the sediments, and remain there for years, depending on response action and the amount of biodegradation and chemical or physical weathering that takes place.

Very small refined product or crude oil spills generally would cause negligible to minor impacts on wetlands unless the wetland is small and isolated from other waterbodies. In these cases, the ecological impacts may be substantial to the resources present because the majority of the wetland may be exposed to the oil. Larger spills could result in substantial ecological impacts to wetlands because of the large size of the spill and the proportion of the wetlands that would be affected, especially if wetlands are heavily used by migratory waterfowl.

Vegetation

Vegetation could be impacted by small or large spills. Because most spills would likely be very small and would likely occur within the right-of-way, their effects would be highly localized at the leak/spill point. However, significant and large- to very large spills could reach the adjacent vegetation and habitat by directly flowing from a pipeline release site. During winter, sufficient snow cover or sufficiently low temperatures may slow the flow of spilled oil and allow spill cleanup efforts to occur before oil spreads substantial distances from the release source. Thus, even a large spill could result in a limited impact to vegetation and habitat. Cleanup operations, however, could adversely affect vegetation and habitat if activities are not implemented carefully and with regard for minimal disturbance of the surface soils and vegetation. Whenever there are warmer temperatures and little to no snow cover, spilled oil may flow over the land surface, thereby increasing the area where vegetation is potentially affected.

Most oil spills would cover less than an acre, but large to very large spills might cover several acres to tens of acres, especially associated with aquatic habitats. After past spills, terrestrial habitats and ecosystems have shown a good potential for recovery, with wetter areas recovering more quickly than relatively drier areas (Jorgenson and Martin 1997, McKendrick 2000). The length of time that a spill persists depends on several factors, including oil and soil temperature, availability of oleophilic microorganisms (organisms that biodegrade oil), soil moisture, and the concentration of the product spilled. For the most part, the effects of oil spills in upland areas would be localized and are not expected to contaminate or alter the quality of habitat outside a limited area. Spills that occur within or near streams, rivers, and lakes could affect riparian vegetation and habitat along these waterbodies.

Wildlife

Birds

Small spills on or near the right-of-way, roads, or Project-related facilities would not be expected to affect local populations of birds, although a few individual shorebirds, waterfowl, and raptors could be exposed to the spilled oil. Exposed individuals could die from hypothermia or from the toxic effects of ingesting the oil. In the small ponds and creeks that could be affected by very small to small spills, similar potential impacts would be limited to a few individual birds, especially waterfowl and shorebirds. These spills would not cause a population-level impact.

A substantial to very large spill onto dry land could cause the mortality of small numbers of birds from direct contact. If the spilled oil enters local or inter-connected wetlands, water-dependent birds and waterfowl, plus additional shorebirds, could be exposed. The numbers of individuals oiled would depend primarily on the volume and type of oil released, the specific conditions at the release site (e.g., flow rate, wind), and the numbers and positions of birds in relation to the location where the oil enters the water.

A variety of waterfowl and shorebird species could be present in wetlands, streams, or small rivers, particularly during the spring and fall migrations. If a spill were to reach those habitats, losses could be substantial and at the local population level for resident species, but likely would be negligible for migrating species with large geographic distributions. If raptors, eagles, owls, vultures, and other predatory or scavenging birds are present in the spill vicinity, they could become secondarily oiled by eating oiled birds. Mortality of breeding raptors likely would represent a minor loss for the local population but is not likely to affect the regional population. Threatened and endangered species are discussed separately below.

If a large spill flows into wetlands, adjacent riparian habitats, or the open water habitats of other major rivers along the right-of-way, several waterfowl species that breed, stage, or stop there during migration

may be at risk. A spill entering a major river in spring, especially at flood stage could contaminate overflow areas or open water where spring migrants of several waterfowl species concentrate before occupying nesting areas or continuing their migration. In addition to the expected mortality due to direct oiling of adult and fledged birds, potential effects of a large spill in these areas include mortality of eggs due to secondary exposure by oiled brooding adults; loss of ducklings, goslings, and other non-fledged birds due to direct exposure; and lethal or sub-lethal effects due to direct ingestion of oil or ingestion of contaminated foods (such as insect larvae, mollusks, other invertebrates, or fish). Although the effects of a spill of this size on local or regional populations would be greater than for smaller spills, the effects of even a large spill would attenuate with time as habitats are naturally or artificially remediated and populations expand to again use them.

Mammals

Oil spills, even large to very large ones, tend to result in a limited impact on most of the terrestrial mammals found in the pipeline area. The proportion of habitat affected would be very small relative to the size of the habitat used by most of the mammals. In addition, most of the mammals would not be present in the immediate vicinity of the spill or would be limited in abundance and distribution in the general area.

A large to very large spill on land along or adjacent to the pipeline right-of-way could affect terrestrial mammals directly or indirectly through impacts to their habitat or prey. For example, a large spill likely would affect vegetation, the principal food of the larger herbivorous mammals, both wild (such as deer) and domestic (cattle). Most mammals, especially larger ones, would be expected to avoid ingesting oiled vegetation because they tend to be selective grazers and are particular about the plants they consume. For most spills, control and cleanup operations (ground traffic, air traffic, and personnel) at the spill site would frighten animals away from the spill and reduce the possibility of these animals grazing on the oiled vegetation. Nevertheless, the spilled oil could affect the vegetation and reduce its availability as a food source for several years. This impact would be limited in area and would not affect the overall abundance of food for grazing mammals.

Small mammals and furbearers could be affected by spills due to oiling or ingestion of contaminated forage or prey items. These impacts would be localized around the spill area and would not cause population-level impacts.

For large spills that are not immediately or successfully cleaned up, contamination would persist for a longer time and the likelihood of animals being exposed to the weathered oil would be greater. Cleanup success could vary, depending on the environment, although over time, any remaining oil would gradually degrade. Oiling of animals likely would not remain a threat after cleanup efforts; however, some toxic products could remain for some time. Depending on the spill environment, part of the oil could persist for up to 5 years or more.

Fisheries

Aquatic habitats include wetlands, ponds, lakes, drainage ditches, streams, and rivers. If spilled oil reaches aquatic habitats, it could affect fish, macroinvertebrates (such as mussels, crustaceans, insects, and worms), algae and aquatic plants, amphibians, and reptiles. Response to winter spills could contain and remove almost all of the oil from ice-covered waterbodies prior to snowmelt. During the rest of the year, spills could reach and affect waterbodies and aquatic habitats.

The effects of oil spills on freshwater fish, macroinvertebrates, and other aquatic organisms have been documented and discussed for many spills. These assessments indicate that the effects of a spill depend

on the concentration of petroleum present, the length of exposure, and the stage of development involved (larvae and juveniles are generally most sensitive [McKim 1977]). If there were lethal concentrations of hydrocarbons encountered, mortality of aquatic organisms could occur. Although lethal effects of oil on fish have been established in laboratory studies (Rice et al. 1979, Moles et al. 1979) and documented for small, enclosed waterbodies, there is little documentation of large fish kills after oil spills. This is likely because toxic concentrations are seldom reached. When oil reaches water, sub-lethal effects are more likely to occur, including changes in growth, feeding, prey availability, fecundity, survival rates, and temporary displacement.

Hydrocarbon concentrations observed under the oil slick of oil spills usually have been less than the acute toxic values for fish, macroinvertebrates, and plankton; the concentrations of hydrocarbons in flowing rivers and creeks would be relatively low, even for most significant to large oil spills.

If an oil spill of sufficient size occurred in a small body of water with restricted water exchange (such as ponds and small, slow-flowing creeks) that contained fish or other sensitive aquatic species, lethal and sub-lethal effects could occur for the fish and food resources in that waterbody. Toxic concentrations of oil in a confined area could result in greater lethal impacts on larval/juvenile fish versus adults. If a large to very large spill reached a slow-flowing, small- to moderate-size river in summer, the impacts due to toxic exposures may be greater than at other times in the same river when flows are higher and water temperatures are cooler.

McKim (1977) found that, in most instances, larval and juvenile stages were more sensitive than adults or eggs. Increased mortality of larval fish is expected because they are relatively immobile and are often at the water's surface, where contact with oil is more likely. It is expected that most adult fish would be able to avoid contact with oiled waters during a spill in the open water season, but survival would be expected to decrease if oil concentrations in the water column were to reach an isolated pool, especially if it was ice-covered. Reducing food resources in a closed lake or pond could decrease the fitness of the fisheries resources and potentially reduce reproduction until prey species recovered.

Impacts could occur if oil spilled during a high-water event (such as spring floods or a dike failure) dispersed into adjacent wetlands or lakes with connections to the rivers and large creeks. In these areas, lethal effects to fish would be unlikely during high-water events floods because toxic concentrations of oil would be unlikely to be reached. However, releases into small lakes that are normally not connected to the river/creek system except during the high-water periods could result in toxic concentrations.

Most oil spills are not expected to measurably affect fish populations in the Project area. Oil spills occurring in a small body of water containing fish with restricted water exchange might be expected to kill a small number of individual fish but are not expected to measurably affect fish populations. The same assessment is generally applicable to many of the macroinvertebrates, amphibians, and reptiles because they are motile and generally have a wide geographic distribution. However, a large to very large spill could affect aquatic organisms at a local population level, especially sedentary organisms (e.g., mussels) or those with a limited geographic distribution.

Although very unlikely to occur, a large to very large spill from a break in the pipeline under or adjacent to a river could affect water quality and aquatic resources, as well as subsistence and recreational uses of the down-current areas. If the spill were not initially detected, especially under ice, the volume of oil could be substantial. Fish and macroinvertebrates in the deeper pools may be exposed and die. In addition, containment and cleanup of a large or very large oil spill could be difficult, depending on the season of occurrence (such as winter freezeup compared to spring breakup or summer open water). Fish and other aquatic animals and plants, and riparian habitats could be affected for a substantial portion of the down-current channel.

Threatened and Endangered Species

In general, the potential impacts to the habitats used by threatened, endangered, and protected species are included in the previous discussions of impacts to biological resources. The important additional consideration for these species is that, by definition, their distribution and population sizes are limited. Although exposure to oil may adversely affect only a few individuals or a small, localized population of individuals, such a loss may represent a significant portion of the population or gene pool. Consequently, even a very small spill could substantially affect a threatened or endangered species. Spilled oil is more likely to affect species that heavily use or completely depend on aquatic and wetland habitats than those using terrestrial habitats.

4.13.5.5 Land Use, Recreation and Special Interest Areas, and Visual Resources

Agriculture is the predominant land use along the pipeline corridor, comprising about 40 percent of land crossed by the Alberta Clipper Project. As noted earlier, a large to very large spill could affect agricultural activities, including irrigation water supplies. Potential effects to agriculture would be minimized by implementing Enbridge's AMP (Appendix F) and ERP (Sections 2.6.5.1 and 4.13.6.4).

Spills in upland areas ranging from very small to very large would typically be confined to construction and maintenance areas, roads, facility sites, or the pipeline right-of-way and adjacent areas. Impacts to recreational uses and wilderness-type values (scenic quality, solitude, naturalness, or primitive/ unconfined recreation) resulting from spills likely would be confined to the same areas and therefore would be negligible to minor. However, if a significant- to very large spill reaches a stream or river, the impacts may be substantial. The spilled oil could result in a short-term (and possibly long-term) impact on recreation values. In the short term, oil residues could affect fishing, boating, kayaking, camping, scenic values, and other recreation pursuits. The long-term effects would be negligible and would include diminished scenic value of the area and a minor reduction to fishing, which would improve as oil residue is cleaned up and weathers.

4.13.5.6 Socioeconomics

Oil spills may affect several components of the socioeconomic environment, including agricultural impacts and economic impacts to local communities.

Short-term disruption in local agricultural production could result from a spill that reaches agricultural lands. The extent of the economic impact would depend on the number of productive acres affected. Crop losses likely would be reimbursed by Enbridge; therefore, the short-term economic impact would be minor. If a spill affected recreational lands, businesses relying on hunting, fishing, and sightseeing activities could experience a short-term negative impact due to avoidance of the area by recreational users. Based on previous spills, any impacts to recreational use would be expected to diminish as visible oil and active cleanup efforts decreased.

Response to oil spills could generate local economic activity for the duration of the spill response activity due to response personnel using local services.

4.13.5.7 Cultural Resources

Most spills would be confined to maintenance or construction areas, roadways, aboveground facilities, the pipeline right-of-way, or adjacent areas. Further, cultural and historical resources identified in the environmental analysis (Section 4.11) that would be potentially eligible under the NHPA have been

avoided by Enbridge in the proposed Alberta Clipper pipeline alignment; therefore, those resources would not be affected by most spills or by subsequent cleanup activities.

Further, since most of the potentially eligible surface and subsurface cultural resources near the facilities and pipeline right-of-way would be documented and avoided prior to construction, the risk of impact due to a spill is low since the Project route would be devoid of recorded historic properties.

Approved Unanticipated Discovery Plans would apply to potential cultural resources encountered during a spill or associated cleanup activities. Implementation of the plan would avoid, minimize, or mitigate impacts on inadvertently encountered cultural resources.

4.13.5.8 Air

Impacts to air quality from an oil spill would be localized and transient, even for very large spills. Evaporation of the lighter hydrocarbon fractions typically occurs within 1 or 2 days and the vapors usually dissipate below risk levels within a short distance of the source even during the first day or two. Although vapors are not typically a hazard for environmental oil spills, the oil spill response contractors or Enbridge health and safety personnel would monitor air for hydrocarbon vapors and would restrict public access to any areas exceeding specified risk levels. They would also ensure that authorized personnel within the restricted areas are equipped with and using appropriate personal protective equipment.

Based on modeling work by Hanna and Drivas (1993), the majority of volatile organic compounds (VOCs) from crude oil spills likely would evaporate almost completely within a few hours after the spill occurred, especially during late spring-early fall, when many of the biological resources (including migratory birds) are present. The heavier compounds take longer to evaporate, particularly at the colder temperatures typical of the winter season and might not peak until more than 24 hours after the spill. In the event of an oil spill on land, the air quality effects would be less severe than those for a spill on water because some of the oil could be absorbed by vegetation or percolate into the ground.

A diesel fuel spill would evaporate faster than a crude oil spill. Initial hydrocarbon concentrations in air would be higher for a diesel fuel spill than for a crude oil spill but would persist for a shorter time. Impacts to air quality related to oil spills would be localized and short term. The associated VOC air emissions would result in little impact on humans or on biological or physical resources.

4.13.6 Mitigation Measures

Enbridge has a series of programs and procedures in place for its existing pipeline systems to ensure the integrity of its pipeline system, to minimize the potential for accidental releases, to detect releases from the pipelines, and to provide for rapid response if an accidental release occurs. As described in Section 2.6, Enbridge would expand those programs and procedures to incorporate the Alberta Clipper Project.

In addition, to minimize the potential for releases from the proposed pipelines and associated facilities, Enbridge would design and construct the proposed Project in accordance with applicable design, engineering, and safety standards, as described in Sections 2.6 and 4.13.1.

With implementation of those plans and procedures, the reliability and safety of the Alberta Clipper Project can be expected to meet or exceed industry standards. Further, the low probability of a large spill event and the routing of the pipelines to avoid many sensitive areas suggest a low probability of impacts to human and natural resources.

The key programs and procedures that would reduce the potential for an accidental release and would mitigate impacts if an accidental release were to occur are summarized below.

4.13.6.1 Operational Procedures

Information on the operational procedures for the Project that are designed to avoid accidental releases from the system is presented in Section 2.6.1. As described in that section, Enbridge would incorporate operation of the Alberta Clipper Project into its existing operations program. Key aspects of operation include the Enbridge Control Center (Section 2.6.1.1), right-of-way inspections and monitoring (Section 2.6.1.2), training (Section 2.6.1.3), and the public awareness program (Section 2.6.1.5).

4.13.6.2 Maintenance Procedures

Proper maintenance of the Project would also be essential to avoiding accidental releases. The existing maintenance program would be expanded to include the Alberta Clipper Project, as described in Section 2.6.2. This existing program includes written procedures used by Enbridge and reviewed by OPS or the Minnesota Office of Pipeline Safety inspectors regarding coating repair, corrosion control, tank maintenance, and all other key procedures associated with proper operation and maintenance of the system.

4.13.6.3 Monitoring Program

Detecting an accidental release as early as possible is critical to minimizing the impacts of the release. Enbridge has an existing operations monitoring program (described in Section 2.6.4) that includes a SCADA system that would be expanded to include the Alberta Clipper Project. This system consists of pipeline sensing devices, a remote computer at each Enbridge pump station, a real-time communications network, a centralized data processing system, and a complete data display that is available to the pipeline control operator. The system includes automated alarms to warn operators when measurements depart from pre-determined maximum and minimum limits. It can automatically initiate pump station shutdowns to maintain safe operating pressures.

To detect smaller releases than possible with the SCADA system, Enbridge operates a Computational Pipeline Monitoring System, which is essentially a subsystem to the SCADA system. This system refines data monitoring to better analyze much smaller deviations in flow than possible with the existing SCADA system. Enbridge installed these additional components, such as pressure transmitting devices, in sensitive areas to increase the ability to remotely detect small releases and would install similar devices in sensitive areas for the Alberta Clipper Project. The Alberta Clipper Project would then be incorporated into the existing Computational Pipeline Monitoring System.

Pipeline control operators also can manually initiate pipeline shutdown when they observe or suspect abnormal conditions. Enbridge enforces a “10-minute rule” that requires operators to shut down a pipeline within 10 minutes of observation of an abnormal condition that cannot be attributed to normal fluctuations in pressures and operating conditions.

4.13.6.4 Emergency Response Plan

If an accidental release occurs, proper and timely response to the incident is critical to minimizing the impacts of the release. Enbridge has an existing ERP (see Section 2.6.5.1) that is implemented when an accidental release or other type of incident occurs. The existing ERP has been approved by OPS and complies with the requirements of 49 CFR Part 194, as well as requirements of OSHA in its final

HAZWOPER rules. The ERP would be expanded to include the Alberta Clipper Project and submitted to OPS for review and approval prior to operation.

The existing Enbridge ERP includes pre-planning, equipment staging, notifications, and emergency and release containment procedures. Emergency response measures used by Enbridge are summarized in Appendix Q. The primary planning components of the ERP include the following:

- Preparing and maintaining adequate safety equipment for responders to perform their jobs;
- Preparing and maintaining hazardous materials spill kits;
- Establishing agreement(s) with mutual aid organizations;
- Establishing contracts with suppliers and service companies;
- Establishing a master service agreement with an oil spill removal organization; and
- Conducting emergency response exercises at least annually.

The primary response components of the ERP include the following:

- Notification – use of the communication protocol;
- Use of the Incident Command System established in the ERP; and
- Containment, Cleanup and Recovery – specific to the following habitats:
  - On land;
  - In rivers or lakes;
  - On or under ice;
  - During ice breakup;
  - In wetlands;
  - In muskeg; and
  - In other sensitive areas.

4.13.6.5 Other Plans and Procedures

In addition to the above plans and procedures, Enbridge has developed measures to minimize the likelihood of a release during construction and to limit the extent, magnitude, and duration of impacts from the release. These include the following:

- SPCC Plan (Appendix E);
- State-specific EMPs (Appendix C); and
- Construction Environmental Control Plan (Appendix M).

4.13.7 References

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4.14 CUMULATIVE IMPACTS

4.14.1 Introduction

As defined in 40 CFR 1508.7, cumulative impacts are the incremental impacts on the environment resulting from the proposed action in combination with other past, present, and reasonably foreseeable future actions. Cumulative impacts were assessed by combining the potential environmental impacts of the proposed action with the impacts of projects that have occurred in the past, are currently occurring, or are proposed in the future within the pipeline corridor or in the vicinity of the pipeline right-of-way. CEQ "Guidance on Consideration of Past Actions in Cumulative Impacts Analysis" (CEQ 2005) explicitly does not require that all actions be individually described since the impacts of previous and ongoing actions are represented in the existing environment, which is described in Section 4.0 of this EIS. The focus of the projects described in this section is on current and reasonably foreseeable projects that may impact the environment to a greater degree than would be currently represented by the existing environment (such as future changes in land use or air emissions).

In accordance with CEQ guidance (1997), EO 12114, and CFR 161, this EIS, including the cumulative impacts analysis, evaluates only impacts of projects in the United States, and focuses on environmental impacts that occur in the United States. EO 12114 identifies conditions or exceptions where an agency may incorporate environmental review of projects outside of U.S. jurisdiction—primarily including major federal actions significantly affecting the environment outside of the jurisdiction of any nation, or in a foreign nation not otherwise involved in the project. The Alberta Clipper Project would not satisfy the exceptions identified in EO 12114 since the portion outside the United States is located in a recognized nation (Canada), and Canada has conducted its own environmental review of the portion of the Alberta Clipper Project in Canada. The CNEB conducted its environmental review of the portion of the Alberta Clipper Project in Canada and approved it for construction in February 2008 (additional information is available at www.neb.gc.ca). Construction of the Canadian portion of the pipeline began in August 2008.

Cumulative impacts can be assessed at various geographic scales. In general, the broader the geographic extent considered, the less sensitive the impacts of a specific project would be relatively, but the more useful the results could be in considering broad cumulative impacts on the general environment. The smaller the geographic extent considered, the more substantial the relative impacts of a specific project would be on the limited environment related to that smaller geographic scope. Therefore, this cumulative analysis included an assessment of Project-related cumulative impacts at both a relatively large geographic scale and a smaller geographic scale.

The large-scale cumulative impacts analysis focused on potential impacts of the proposed Project relative to other large-scale projects that could impact the environment at a Project-wide, regional, or even global scale, such as overall land conversion and air quality impacts. In addition, the cumulative analysis assessed potential impacts at a smaller scale within individual watersheds along the proposed Alberta Clipper Project route.

Since the primary impacts of the Alberta Clipper Project would be related to short-term construction impacts and long-term land conversion, the large-scale cumulative impacts analysis focused on potential impacts of other large-scale projects that could result in similar short-term construction impacts or long-term land conversion impacts, including related impacts to habitats and biological communities on that land (see Section 4.14.3). While the Alberta Clipper Project itself would result in minimal, short-term or long-term impacts to air emissions, the large-scale cumulative impacts assessment evaluated potential impacts to air quality of pipeline construction and operation in conjunction with refining of the heavy crude oil that would be transported by the Alberta Clipper Project at a regional level (or greater).

In addition to this large-scale analysis, this cumulative impacts analysis assessed potential cumulative impacts on a watershed-by-watershed basis as they relate not only to larger scale projects but also to smaller scale projects in each of the individual watersheds along the Alberta Clipper Project route (see Section 4.14.4).

4.14.2 Past, Present, and Reasonably Foreseeable Projects

As discussed above, the 2005 CEQ "Guidance on Consideration of Past Actions in Cumulative Impacts Analysis" does not require all actions to be described since the impacts of previous and ongoing actions are represented in the existing environment (described in Section 4.0 of this EIS). The following discussion focuses on current and reasonably foreseeable projects that may impact the environment to a greater degree than would be currently represented by the existing environment. In general, reasonably foreseeable projects were those that have been formally proposed and for which adequate information is available concerning the potential impacts to provide meaningful estimates for inclusion in the analysis.

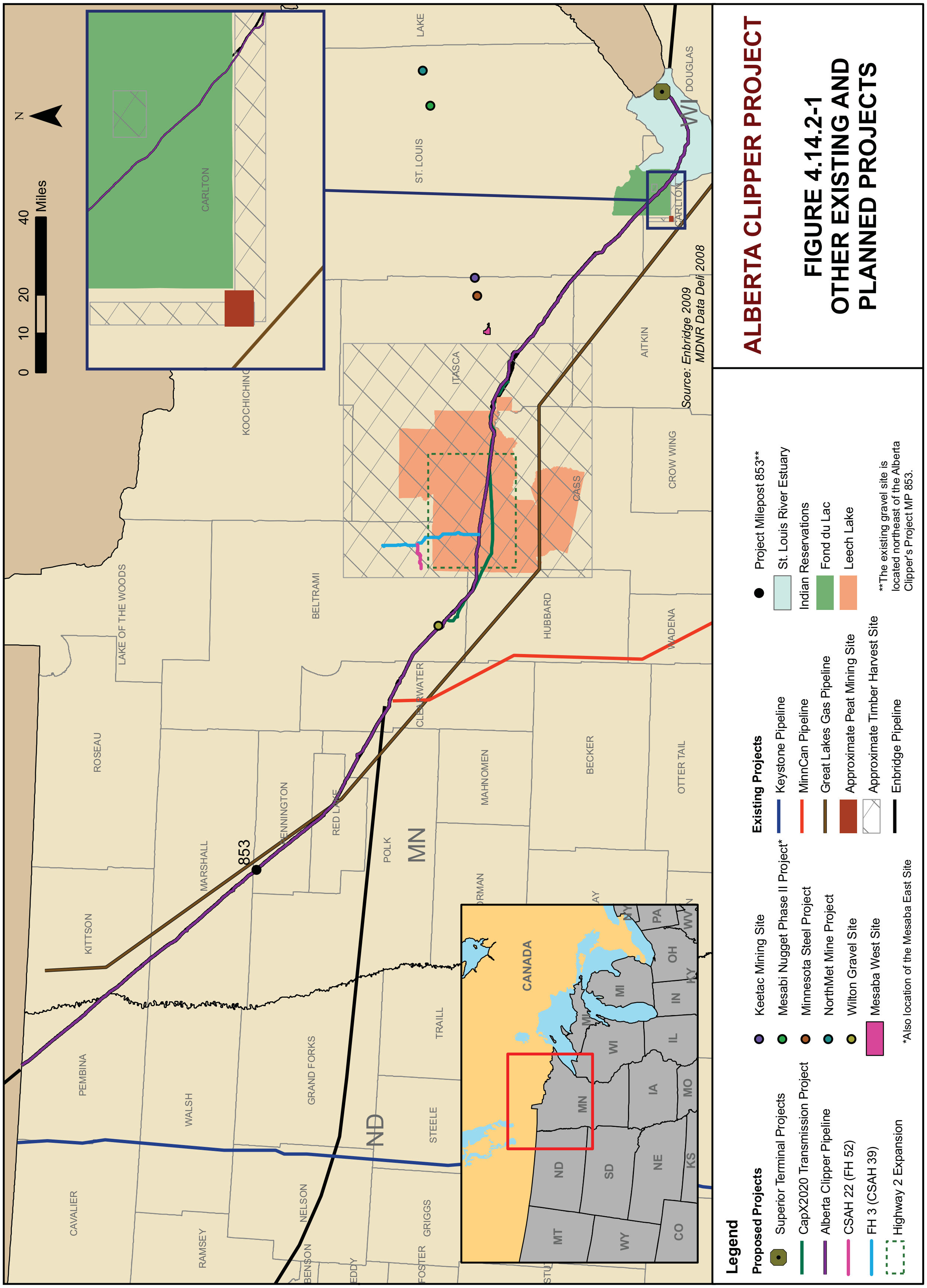
4.14.2.1 Large-Scale Projects

Other large-scale projects that could result in similar impacts to those of the Alberta Clipper Project primarily include existing and proposed pipelines in the general Project area. For the purposes of this large-scale assessment, the "general Project area" or region of influence (ROI) refers to the total area encompassed by the 11 watersheds that would be crossed by the Alberta Clipper Project. Existing large-scale pipelines in the ROI include the pipelines within the existing Enbridge right-of-way, the Keystone oil pipeline, the MinnCan oil pipeline, and the Great Lakes Gas natural gas pipeline (Figure 4.14.2-1).

There are currently six pipelines in the right-of-way between Neche, North Dakota and Clearbrook, Minnesota, and four existing pipelines in the Enbridge right-of-way between Clearbrook, Minnesota and Superior, Wisconsin. These existing pipelines transport crude oil or petroleum products. A fifth pipeline would be installed within the corridor south of Clearbrook (Diluent Project) at approximately the same time as the Alberta Clipper pipeline, and the associated acreage impacts of the Diluent Project pipeline have been incorporated into the environmental review described throughout Section 4.0 of this EIS. For more information on the Enbridge pipeline system, see Section 1.7.

The FEIS for TransCanada's Keystone crude oil pipeline was issued in January 2008, and construction began in May 2008. When completed, the Keystone pipeline will extend approximately 1,384 miles within the United States, from the U.S./Canada border in western Pembina County, North Dakota to terminals at Cushing in Oklahoma, Wood River in Illinois, and Patoka in Illinois. The Keystone pipeline generally follows a southerly route across North Dakota, South Dakota, Nebraska, and Kansas. From Kansas, one portion of the Keystone pipeline extends east across Missouri to southern Illinois, and a second portion extends south to Cushing, Oklahoma. Construction of the Keystone pipeline began in North Dakota and is continuing south. The Keystone pipeline intersects the proposed Alberta Clipper Project route in eastern Pembina County, North Dakota. The Keystone construction right-of-way is generally 110 feet wide (about 13 acres per mile), and the operational right-of-way would be 50 feet wide (about 6 acres per mile).

The MinnCan oil pipeline extends approximately 295 miles from the Clearbrook Terminal in Clearbrook, Minnesota to the Flint Hills Refinery in Rosemount, Minnesota. Construction of the 24-inch pipeline, completed in September 2008, will provide up to 165,000 bpd of crude oil from Canada to refineries in the Twin Cities area. In the Alberta Clipper ROI, the MinnCan pipeline is collocated with the Minnesota Pipe Line Company (MPL) right-of-way through primarily agricultural land in the Clearwater watershed


ALBERTA CLIPPER PROJECT
FIGURE 4.14.2-1
OTHER EXISTING AND PLANNED PROJECTS
Source: Enbridge 2009
MDNR Data Deli 2008
Legend
Proposed Projects
Superior Terminal Projects
CapX2020 Transmission Project
Alberta Clipper Pipeline
CSAH 22 (FH 52)
FH 3 (CSAH 39)
Highway 2 Expansion
Keetac Mining Site
Mesabi Nugget Phase II Project*
Minnesota Steel Project
NorthMet Mine Project
Wilton Gravel Site
Mesaba West Site
*Also location of the Mesaba East Site
Existing Projects
Keystone Pipeline
MinnCan Pipeline
Great Lakes Gas Pipeline
Approximate Peat Mining Site
Approximate Timber Harvest Site
Enbridge Pipeline
Project Milepost 853**
St. Louis River Estuary
Indian Reservations
Fond du Lac
Leech Lake
**The existing gravel site is located northeast of the Alberta Clipper's Project MP 853.
0 10 20 40 Miles
N
853
ND
MN
WI
CAVALIER
PEMBINA
KITTSON
ROSEAU
LAKE OF THE WOODS
KOOCHICHING
ST. LOUIS
LAKE
RAMSEY
WALSH
MARSHALL
BELTRAMI
ITASCA
CARLTON
DOUGLAS
NELSON
GRAND FORKS
PENNINGTON
RED LAKE
CLEARWATER
HUBBARD
CASS
AITKIN
GRIGGS
STEELE
TRAILL
POLK
MAHNOMEN
BECKER
WADENA
CROW WING
OTTER TAIL
CANADA
MT
WY
ND
SD
NE
CO
KS
MN
IA
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IN
OH
KY
PA
NY
WV

(see Section 4.14.10). Along this portion, the expansion of the permanent right-of-way for the MinnCan pipeline totals approximately 4 acres per mile.

Great Lakes Gas operates a pipeline system with a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. Based on its proximity to the Alberta Clipper Project, it is expected that the pipeline right-of-way crosses the same basic land types (and roughly proportional amounts of each type) as the Alberta Clipper Project. The operational right-of-way is generally 75 feet wide, which corresponds to approximately 9 acres per mile, although it varies in areas where the pipeline is looped or collocated.

In general, the areas impacted by the construction of pipelines that were installed decades ago have recovered although some impacts may linger due to historical installation and maintenance methods, leak detection, and response measures. Pipelines installed more recently use modern materials and installation methods, and must adhere to tighter regulatory standards and permit requirements. The areas within the construction footprint of these recent projects may still be recovering from short-term impacts; specifically, erosion stabilization and revegetation measures may not yet have achieved pre-construction conditions.

In addition to the identified pipeline projects in the ROI, Murphy Oil has been considering an expansion of its refinery in Superior, Wisconsin to upgrade the capacity and refining capabilities to process heavy crude from oil sands. The Murphy Oil Refinery is located near Enbridge's Superior Terminal. If approved and implemented, construction of this refinery expansion could increase the acreage impacted by the Murphy Oil refinery by about 400 acres. Approximately 250 to 350 acres of this expansion would consist of filling wetland habitat. During operation, this expansion could reportedly increase the capacity of the refinery from about 35,000 to 235,000 bpd. Murphy Oil has not submitted permit applications for the refinery expansion, and the project is on indefinite hold since Murphy Oil does not currently have a business partner to provide the heavy crude oil (Superior Telegram 2008). Currently, it would be speculative to assume that this project will ever move forward. If the expansion project did move forward, it would require completion of a federal EIS, as well as federal, state, and local permitting associated with potential impacts to wetlands, air quality, and other environmental resources. The project is on indefinite hold and there is minimal impact information available for analysis. Nevertheless, this cumulative impact analysis considered potential impacts associated with potential refinery expansion, focusing on wetland impacts and refining emissions.

The emissions of criteria pollutants and GHG associated with refining the oil transported via the Alberta Clipper Project at other potential refineries were assessed (see Section 4.14.3.12). Although long-term air emissions within the ROI would not be substantial during construction or operation of the Alberta Clipper pipeline, the potential impacts to general air quality associated both with transporting oil via the Alberta Clipper pipeline and refining the heavy crude oil that would be transported by the Alberta Clipper pipeline beyond the ROI are described in Section 4.14.3.12 to address concerns expressed by agencies and the public.

4.14.2.2 Small-Scale Projects

This cumulative impacts analysis also considered small-scale projects on a watershed-by-watershed basis. The purpose of this watershed-level analysis, at the request of the COE, was to provide a more detailed and quantitative evaluation of various project impacts within each of the individual watersheds along the proposed Alberta Clipper Project route. These small-scale projects included potential road construction projects, residential/commercial projects, flood control, mining, energy projects, and conservation

programs (see Section 4.14.4). In addition, specific projects or activities within individual watersheds were assessed based on available information, such as proposed utility corridors (e.g., electric transmission and fiber optic cable projects), timber harvesting, and potential expansion at the Superior Terminal (storage tanks and merchant tanks) (see Figure 4.14.2-1).

4.14.3 Cumulative Impacts Associated with Large-Scale Projects

The following section describes potential cumulative impacts associated with construction and operation of the Alberta Clipper Project when considered in conjunction with other large-scale projects in the general area. The ROI for this cumulative impacts analysis incorporates the 11 watersheds that occur along the Alberta Clipper pipeline route. In total, these watersheds extend from the Pembina River watershed in North Dakota across Minnesota to the Beartrap-Nemadji River Watershed in Wisconsin. Overall, these watersheds total approximately 11.1 million acres, of which less than 0.1 percent would be impacted by construction of the Albert Clipper Project and the other large-scale projects considered in this analysis.

Cumulative impacts to specific resources that are associated with large-scale projects are described below.

4.14.3.1 Geology

Gravel and other mineral resources within the permanent rights-of-way of these large-scale pipelines could not be accessed or extracted. Since the Alberta Clipper pipeline would be largely collocated along the existing Enbridge pipeline right-of-way, it would have little effect on access to mineral resources.

Given the limited acreages of the Alberta Clipper Project in comparison to the potential mineral extraction areas along the corridor, construction of the Alberta Clipper Project would result in minimal impacts to current or future exploitation of mineral resources. Similarly, construction of the Alberta Clipper, LSr, Diluent, Keystone, and MinnCan pipelines have eliminated access to mineral resources along the installed pipeline rights-of-way following construction. However, these projects have had a minor cumulative impact on access to the available mineral resources in the region.

Pleistocene-age mammal fossils may be discovered during construction of the Alberta Clipper Project and other reasonably foreseeable projects. These fossils generally are found in areas of glacial and glacially-derived surface deposits; these occur along the entire length of the proposed Alberta Clipper Project except for areas of bedrock outcrop. However, it is unlikely that any scientifically significant fossils are present in the area of the proposed Project. As a result, the potential for construction of the Alberta Clipper Project to contribute to the cumulative exposure and potential loss of scientifically valuable fossils in the region would be low.

4.14.3.2 Soils and Sediments

Potential cumulative erosion effects could occur where construction disturbance areas overlap or are located near each other, particularly along the sections of the Alberta Clipper Project that are collocated with the existing Enbridge right-of-way. The recently constructed pipelines and the currently proposed pipelines would apply BMPs for soil management and protection along the pipelines and at appurtenant facilities. Revegetation mixtures that are appropriate to soil conditions and expected future uses (such as grazing and wildlife habitat) would be applied to the disturbed areas. In addition, measures would be implemented to minimize soil erosion and soil stabilization if the Superior Terminal and Murphy Oil Refinery are expanded. Consequently, the potential for substantial cumulative erosion effects caused by one or more of these projects is low because consistent erosion control practices would be applied and structural erosion control measures would be integrated between and among adjacent projects.

4.14.3.3 Water Resources

Impacts to water resources associated with crossing of surface waters by linear projects, such as the recently constructed or currently proposed pipelines, generally are localized and short term. Cumulative effects caused by construction would occur if more than one project was being constructed at the same location at the same time (or the construction impacts overlapped in time and space). Thus, theoretically, a minor cumulative impact on water resources would result from concurrent construction of the Alberta Clipper pipeline and the Diluent Project pipeline between Clearbrook and Superior. These waterbody crossings would be conducted using COE-approved LEDPA methods to minimize impacts, and any cumulative impacts of the dual crossings would generally be minor and short term. It is not expected that standard operation of the Alberta Clipper Project would directly impact water resources. Although not directly part of the Alberta Clipper Project, refining the heavy crude oil transported via the Alberta Clipper pipeline could impact water resources due to water discharges at the refinery, as discussed in Section 4.14.3.12. Each project would be required to follow permit conditions specified by the COE, EPA and the affected state and to implement BMPs in order to protect water quality during construction and operation. Therefore, cumulative impacts on water resources in the ROI would be minor.

4.14.3.4 Wetlands

Wetland impacts for the Alberta Clipper Project would total about 1,346.2 acres during construction and 820.7 acres during operation. These totals include wetland areas of special value or concern, such as the MDNR-protected wetlands and wetlands associated with the WRP. Wetland habitat would be restored following construction; however, forested wetland habitat in the permanent right-of-way would be permanently maintained as emergent or scrub-shrub wetland habitat, and revegetation of forested habitats in the construction right-of-way may take decades to recover following construction.

The proposed Project and the other large-scale projects considered would impact wetlands. Along the Alberta Clipper route, the location of the greatest cumulative impact of other projects to wetlands in the ROI would be in the Superior, Wisconsin area where wetland habitat could be permanently converted to upland habitat by expansion of the Superior Terminal (11.3 acres) and the Murphy Oil Refinery if the project were pursued (up to 350 acres). Additional information on specific wetland impacts at Superior is provided in Sections 4.4.4 and 4.14.18.2. Each of these pipeline and expansion projects would be required to follow mitigation measures to avoid and minimize wetland impacts, and to comply with federal and state laws and water quality permits. All impacts to jurisdictional wetlands associated with these permitted projects, including the Alberta Clipper Project, are subject to a COE Section 404 permit, which would require compensatory mitigation intended to ensure no net loss of wetland habitat. There are over 620,000 acres of wetland habitat in the ROI, and these large-scale projects would impact less than 0.1 percent of the wetland acreage. Since the construction impacts to wetlands associated with each of these recent large-scale projects was minimized, wetlands impacts would be mitigated, and impacts to forested wetlands have been or would be addressed through compensatory mitigation, the cumulative impact of these large-scale projects on wetlands in the ROI would not be significant. Additional information on smaller-scale projects within individual watersheds is discussed as part of the watershed-by-watershed cumulative impact starting in Section 4.14.4.

4.14.3.5 Terrestrial Vegetation

The total amount of vegetation affected by all of the recently constructed and reasonably foreseeable large-scale projects, including the Alberta Clipper Project, is relatively small compared to the abundance of similar habitat in the general Project area. In nonagricultural areas, construction of pipelines and other linear and non-linear projects would result in the long-term and permanent loss of non-herbaceous vegetation and would cause a small incremental increase in fragmentation of forested areas. There are

over 2.1 million acres of forested land in the ROI, and these large-scale projects would impact less than 0.1 percent of the forested land in the ROI. In agricultural areas, impacts would be temporary; agricultural production would be restored following construction. All projects would implement mitigation measures designed to minimize the potential for erosion, revegetate disturbed areas, increase the stabilization of site conditions, and control the spread of noxious weeds—thereby minimizing the degree and duration of the cumulative impact to vegetation from these projects.

4.14.3.6 Wildlife

Construction and operation of the Alberta Clipper Project, along with the other recently constructed and reasonably foreseeable projects described in Section 4.14.2, could result in short-term disturbance to wildlife and would result in long-term wildlife habitat modification. Disturbance and removal of vegetation during project construction would incrementally add to the total area of habitat disrupted within the ROI. It may also disturb resident and migrating species and cause associated impacts to these species as they adjust to the changes brought about by the various projects. Increased movement or displacement of species dependent on the disturbed habitats could reduce carrying capacities, reproductive effort, or survival. This potential is greater for species for which suitable habitat is limited in the ROI or that are otherwise sensitive to disturbance.

Removal of woodlands and shrublands during construction would result in a long-term reduction of wildlife habitat because of the slow rate at which woody species regenerate. However, the Alberta Clipper pipeline generally would be collocated with, or in close proximity to, existing pipelines and would generally not affect pristine/undisturbed habitat areas. In addition, each project would be or has been required to follow appropriate mitigation measures, including restoration of habitat, to minimize impacts to wildlife. The various large-scale projects would result in impacts to less than 0.1 percent of the forested land in the ROI, and the contribution of the proposed Project to cumulative impacts on wildlife would be minor. The habitat types potentially crossed or affected are widely available for wildlife use outside of the immediate area of disturbance.

4.14.3.7 Fisheries

Stream channel disturbance and withdrawal of hydrostatic test water from surface water sources that may affect fisheries would occur throughout the ROI during construction. These impacts would be short term and would be minimized by implementation of mitigation measures required by individual state and federal permits. In areas where the proposed Project is collocated with other pipelines (for example, the Diluent Project), the construction schedules are concurrent; therefore, simultaneous impacts on surface waters and fisheries from more than one project could occur. As identified in Appendix P, the crossing methods for the Diluent Project would be comparable to, or more protective than, those proposed for the larger diameter Alberta Clipper pipeline since the smaller diameter Diluent Project would require less trenching. In addition, road bore and guided bore methods are feasible crossing methods for the smaller diameter Diluent Project, which would avoid direct impacts to those waterbodies where it is proposed. Short-term cumulative impacts to fisheries could occur from installation of both projects due to sedimentation or substrate alteration. Because construction would generally not occur simultaneously within waterbodies, the magnitude of turbidity would not be increased relative to the Alberta Clipper Project. In addition, waterbody crossings for both projects would require COE, MDNR, and WDNR permitting, which may require additional mitigation measures for the dual crossings. As a result, no substantial cumulative impact to fisheries would be expected from the dual crossings. While minimal remaining construction impacts to fisheries could be associated with the recently constructed LSr, MinnCan, and Keystone pipelines in the ROI, any cumulative impact to the fisheries community impacted by construction of the Alberta Clipper Project would be minor.

No long-term cumulative impacts to fisheries in surface waters are expected to occur during operations.

4.14.3.8 Threatened and Endangered Species

The range and habitat of a number of threatened and endangered species occur in the general Project area. Construction of the Alberta Clipper Project and other projects in the region, including pipeline projects collocated with the Alberta Clipper, would affect species habitat. Construction impacts would largely be short term as the majority (approximately 80 percent) of the land crossed would be non-forested and would recover relatively quickly following construction. Approximately 20 percent of the area disturbed is forested land, which would require a longer period to return to pre-construction habitat condition or would remain cleared for pipeline maintenance and inspection. All improvements made to aboveground facilities would be within prior converted lands (e.g., developed lands) and would not affect habitat for protected species. The amount of habitat permanently modified would equate to 2,244.2 acres. Most threatened and endangered species found within the ROI range over much larger areas; therefore, the short-term loss of habitat due to construction of the Alberta Clipper Project is not likely to cumulatively affect habitat or cause long-term displacement of species. Longer term habitat loss would affect a very small area associated with these projects (less than 0.1 percent of the available forested land in the ROI) and is not expected to be significant when considered in the context of the ROI.

4.14.3.9 Land Use, Recreation and Special Interest Areas, and Visual Resources

Land Use

The Alberta Clipper Project would affect a variety of different land use types during both the construction and operation phase of the Project. However, these land use impacts would be minimized by largely constructing the new pipeline parallel to existing pipelines, thereby reducing the amount of land conversion relative to a new right-of-way. All new aboveground facilities would be located at existing stations and would not generally impact new lands. Most of the existing land use would be allowed to revert to pre-construction uses following construction except forested land in the permanent right-of-way. This includes agricultural land for both the Alberta Clipper Project and the other large-scale pipeline projects in the ROI. The proposed Project would permanently impact 622.2 acres of forested uplands and 495 acres of forested wetlands that would not be allowed to revert to pre-construction conditions. The proposed Project, in conjunction with the other large-scale projects, would result in impact to less than 0.1 percent of the forestland in the Alberta Clipper ROI. The construction footprints of these projects total approximately 0.2 percent of the agricultural land in the ROI; however, these construction impacts have been or would be largely short term since the agricultural land would return to its previous use following construction (with minimal exception). Overall, the proposed Alberta Clipper Project would result in a minor contribution to cumulative impacts on forestland and agricultural land along the extent of the proposed right-of-way.

Recreation and Special Interest Areas

Numerous recreation and special interest areas would be impacted by the proposed Project, including national and state forestlands, snowmobile trails, NRI rivers, Indian reservations, and hunting and fishing lands. Most of the land used during pipeline construction is considered hunting land, and hunting activities would be restricted during the construction of the pipeline. However, all of these lands would revert to full recreational uses following construction. The Alberta Clipper Project, in conjunction with other large-scale projects in the ROI, would not significantly impact recreation and special use areas.

Visual Resources

The temporary presence of construction equipment and cleared linear right-of-way are the primary visual impacts expected from the Alberta Clipper Project and other pipeline projects that may occur in the ROI. The visual impacts would be cumulative in areas where the Alberta Clipper Project is collocated with other pipelines. The duration of the impact would be temporary, except in areas where forest vegetation was cleared. Trees that were cleared from the construction right-of-way would be able to revert to forest vegetation; however, this could take decades and therefore would be a long term impact. Trees cleared from the permanent right-of-way would be a permanent impact; the amount of trees cleared would add to the amount of trees cleared during construction of past pipeline projects in the area.

Aboveground facilities for the Alberta Clipper Project would be relatively small and would be spaced at substantial distances from each other and from the facilities of non-Enbridge pipelines in the ROI. Because visual impacts would be localized, the spacing of aboveground facilities precludes cumulative visual impacts. To the extent that aboveground pipeline facilities would be located in proximity to other industrial facilities (e.g., pump stations, terminals, and the Murphy Oil Refinery expansion), the existing industrial facilities would dominate the landscape and the Alberta Clipper pipeline facilities would contribute a small increment to visual impacts in the viewshed.

4.14.3.10 Socioeconomics

The presence of construction workers and their need for housing and other services are the primary socioeconomic impacts of the proposed Alberta Clipper Project. Construction workers are expected to utilize the closest available local rental, motel/hotel, RV, and camping facilities during construction of each spread. The pace of construction and movement of workers along the pipeline route would limit the duration of such impacts to a brief period. To the extent that other activities, including construction of the Superior Terminal Expansion Project, occur in a local area at the same time as the Alberta Clipper Project, cumulative impacts—including housing shortages—may occur. These potential impacts would be short term and minor.

Pipeline construction activities for the Alberta Clipper Project and Diluent Project, which would mainly occur in rural areas, would use local highways and roads for delivery of materials and equipment and for worker access during construction. Traffic impacts on rural roads along the pipeline right-of-way may temporarily increase due to construction-related activities such as road or lane closures, increased volume, or road damage. If other local activities or smaller-scale construction projects also are occurring in the same local area, a cumulative increase in traffic volume may occur.

During construction of the Alberta Clipper Project, the Applicant's expenditures for payroll, local purchases, and related tax revenues would provide a short-term beneficial impact to the affected counties. Similar benefits are likely to be associated with any other non-linear or industrial projects. In addition, the increased tax revenue paid to the state and local governments over the life of the projects may result in a beneficial long-term cumulative impact.

Operation of the proposed facilities would require relatively few permanent employees with the possible exception of the Murphy Oil Refinery expansion; thus, there would be no long-term cumulative or additive impacts related to population, housing, traffic levels, or municipal services in the ROI. No information is available on the permanent workforce for the Murphy Oil refinery expansion if the project were to proceed, but operation of the Alberta Clipper Project would not substantially contribute to population, housing, traffic levels, or municipal services in the ROI.

4.14.3.11 Cultural Resources

In regard to cultural resources, the primary cumulative impact would be related to soil disturbance from project construction (other pipelines and the Murphy Oil Refinery expansion). The impacts of these projects would be similar to those of the proposed Project in that additional soil disturbance could cause adverse effects to known and undiscovered historic properties. The Alberta Clipper pipeline would largely be collocated with the Diluent pipeline, the LSr pipeline, and the other existing pipelines in the Enbridge right-of-way. As with the Alberta Clipper Project, the other large-scale projects in the ROI feature or have featured a level of federal government involvement that requires compliance with 36 CFR 800, the ACHP's regulations for implementing Section 106 of the NHPA. The lead federal agencies for those projects have been or would be required to consult with the appropriate SHPOs, Indian tribes, and other applicable consulting parties; identify and evaluate cultural resources; and avoid, minimize, or mitigate any effects upon historic properties. For any non-federal actions in the ROI, project proponents would be required to comply with any identification and evaluation procedures and mitigation measures required by the state where the action is proposed. Such regulations could address inadvertent discoveries of cultural resources, the disposition of discovered human remains, and other resource protection laws. Enbridge has mitigated possible effects on potentially eligible cultural and historic properties through avoidance wherever possible. Because of collocation with existing disturbed alignments for substantial distances along the proposed right-of-way and avoidance of potentially eligible properties wherever possible, the incremental impact of the Alberta Clipper Project (and the Diluent Project) to cultural resources in the ROI would be expected to be minor. No modifications to the setting of historic properties would occur from the proposed Project or the Superior Terminal expansion.

4.14.3.12 Air Quality, Greenhouse Gases, and Climate Change

The following discussion identifies potential impacts to air quality associated with construction and operation of the proposed Alberta Clipper Project and other large-scale projects in the ROI. In addition, the discussion includes potential impacts to air quality associated with refining of heavy crude oil that would be transported via the Alberta Clipper Project and end use of that refined product. Potential air quality impacts from mining projects, along with a proposed power plant, are discussed in the watershed-by-watershed analysis in Section 4.14.4 below.

Pipelines

The primary impact of the proposed Alberta Clipper Project and other pipelines in the area associated with emission of criteria pollutants would occur (or did occur) during construction due to dust generated by excavation and materials handling, operation of construction equipment, and open burning. Construction emissions for the Alberta Clipper Project and the Superior Terminal Expansion Project are presented in Section 4.12.1. Construction emissions of the Alberta Clipper Project would not overlap with those from the other pipeline projects in the ROI, except the Diluent Project, since construction for those projects has been completed, and any impacts to air were localized and occurred during the short duration of the construction period for each spread.

Construction emissions would also include GHG associated with construction activities and soil/sediment disturbance. Direct GHG emissions during construction of the Alberta Clipper Project and the Superior Terminal would total approximately 27,000 metric tons of carbon dioxide (CO_2) (see Section 4.12.1). In addition to direct emissions, soil/sediment disturbance during construction would result in carbon emissions. Carbon emissions associated with habitat disturbance would be less in some specific habitats and greater in others, such as wetlands, especially peat bogs, and forested areas, due to the carbon sequestration in these habitats. Peat bogs in Minnesota may sequester an average of over 750 metric tons of stored carbon per acre (Anderson et al. 2008). Forestlands may contain approximately 100 metric tons

per acre in aboveground and belowground biomass. Disturbance of these carbon sources can result in relatively rapid decomposition and rapid release of CO_2 into the atmosphere. The rate of carbon release would vary widely based on habitat type, magnitude and extent of disturbance, decomposition rate, and deposition method of biomass (e.g., wood burning or lumber). Therefore, it is not possible to develop accurate estimates of this carbon release associated with construction. Following construction, the disturbed wetlands would continue to function as wetlands, the permanent right-of-way would immediately be reseeded to initiate revegetation, and the forested areas in the construction right-of-way would regenerate as forest (although it may take decades). In addition, wetland impacts would require compensatory wetland mitigation, which would also serve to offset carbon releases.

With the exception of the Diluent Project, construction of the other pipeline projects would not overlap in time with that of the Alberta Clipper Project. To the extent that construction of the Diluent Project or any other nearby construction activities are simultaneously underway in a specific locality, cumulative impacts to air quality may occur, but potential impacts would be minor and short term.

During operations, direct emissions from the proposed Project would be limited to the operation of inspection vehicles and fugitive emissions from the flanged valves and fittings. The operation of vehicles for inspection is a low-emission, temporary activity. Fugitive emissions from the Alberta Clipper Project would be up to 0.5 ton of VOCs per year, primarily from three pump stations (0.3 tpy). These emissions are not expected to cause substantial cumulative impacts to air quality. Indirect emissions during operation would include electrical generation for the pump stations. Emissions of criteria pollutants from the electrical generating facilities are permitted by EPS and/or the appropriate state agencies (emissions from these facilities would be permitted and the permitting process would include avoiding significant cumulative impacts to air quality and visibility). Enbridge estimates that the incremental electrical demands of the pump stations to transport the oil volume proposed for the Alberta Clipper Project (450,000 bpd) will result in approximately 0.3 million metric tons of CO_2 per year emitted from power plants. Direct emissions associated with operation of the Superior Terminal Expansion Project would primarily consist of VOCs. As described in Section 4.12.1.4, the project emissions would be 39.1 tpy compared to current terminal operations, which total almost 100 tpy.

Recent and current pipeline construction projects include the LSr, MinnCan pipeline, and Keystone pipeline projects in the general vicinity of the Alberta Clipper Project. While all these projects have been completed in the ROI prior to initiation of construction of the Alberta Clipper Project, minor restoration and recovery of the natural resources associated with short-term impacts of construction in the ROI could be continuing. The Alberta Clipper and Diluent Project pipelines would be constructed at approximately the same time in the same right-of-way. The emissions associated with this concurrent construction would be minor and short term, as described in Section 4.12.1.3.

During operation, the pipelines in the ROI would use electricity for pump stations along oil pipelines and natural gas for compressor stations. Since natural gas generally results in lower emissions than the oil or coal used to generate electricity for the pumps stations, it is expected that the emission estimates for the Enbridge pump stations would be higher than those for compressor stations. Compressor stations would be permitted as minor sources. Therefore, little if any measurable impact to regional air quality would be expected because of operation of the pump stations or compressor stations for these pipelines.

For comparison, transport of crude oil to the U.S. Midwest from Canada via pipeline would result in substantially lower emissions, including GHG, than transporting the crude oil via tanker from historical oil sources in the Mideast, Africa, and South America. This is especially true because the crude oil delivered to the Midwest from those foreign sources would typically require off-loading at ports along the U.S. Gulf Coast and transporting the oil to the Midwest via pipelines that would be substantially longer than the Alberta Clipper Project and roughly approximate the length of the pipeline necessary to transport

the crude oil from Hardisty, Alberta, Canada to refineries in the United States. Thus, all emissions, including GHG, from the ocean-going tankers would generally be over and above those required for pipeline transport within North America. Delivering the volume of crude provided by the Alberta Clipper from the Persian Gulf to the U.S. Gulf Coast would result in CO_2 emissions solely due to tanker transportation of approximately 0.8 million metric tpy (Barr Engineering 2008).

Refineries

Enbridge is a common carrier of oil in its pipeline system and would continue to be a common carrier for the oil that would be transported via the Alberta Clipper Pipeline. With minimal exception, Enbridge has no ownership interest in the oil that would be transported via the Alberta Clipper Project (less than 0.1 percent) and has no ownership interest in the refineries that could receive the oil. In addition, Enbridge has no commercial control of the specific grade, destination, refinery operations, or ultimate type of refined products associated with the oil that would be transported via the Albert Clipper Project. DOS also has no jurisdiction or regulatory authority over oil refining in the United States. Although not part of the proposed Alberta Clipper Project, air emissions from the refinery operations could result in some degree of cumulative impacts to air quality in the ROI and beyond, and are, therefore, being considered further as part of this cumulative impacts analysis.

With the global increase in oil demand and the decrease in both domestic oil supplies and the availability of other historical foreign supplies to the United States, it is likely that most of the oil volume transported from Canada would serve to replace dwindling supplies instead of substantially increasing U.S. supplies. Absolute estimates of the proportion that would replace other oil supplies are not certain since they are dependent on the complexities of global supply and demand, domestic and global economic health, and political decisions across the globe. However, for context, the United States receives about 99 percent of the heavy crude oil produced from oil sands exported from Canada that are expected to total approximately 1.3 million bpd in 2008 (CAPP 2008). It is expected that these heavy crude oil exports will increase as domestic supply decreases and oil consumption remains relatively stable (EIA 2009). As described in Section 1.2.2.1, EIA (2009) projects that "unconventional oil supply" from Canada will grow from approximately 1.5 million bpd in 2008 to over 4.3 million bpd in 2030. During this same period, refining capacity for the entire United States is expected to increase by approximately only 0.1 million barrels per day between 2010 and 2030 (EIA 2008). Thus, the large majority of this increase in potential export to the United States over the next two decades would be expected to replace existing refining capacity of crude oil from other sources. Potential environmental impacts to air and water associated with refining this oil would not be in addition to current refining emissions but based on incremental changes associated with refining heavy crude oil from oil sands relative to other crude oils that are currently refining heavy and/or light crude oil.

The Alberta Clipper pipeline would connect to the existing pipeline infrastructure in the upper Midwest; thus oil transported via the Alberta Clipper pipeline could be delivered to over 25 refineries in the United States that are currently capable of refining heavy crude oil (see Table 4.14.3-1). Overall, these refineries are located in over a dozen states extending from the U.S./Canada border to the Gulf of Mexico. However, approximately 75 percent of Canadian crude oil currently imported to the United States is delivered to refineries in the Midwest, specifically the area composed of Petroleum Administration for Defense District II, which includes Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, and nine other states generally considered in the Midwest and upper Midwest (EIA 2008).

TABLE 4.14.3-1
Refineries Connected Directly or Indirectly to Enbridge/Lakehead System[a,b,c]

Refinery	Location	Capacity (bpd)	Receive Heavy Oil?[d]	Total Light Imports[e,f] (kbpd)		Total Heavy[g] Imports (kbpd)		Total Light Canadian Imports (kbpd)		Total Heavy[g] Canadian Imports (kbpd)	
				2007	2008	2007	2008	2007	2008	2007	2008
Marathon Petroleum Co.	St. Paul Park, Minnesota	70,000	Yes	27	33	13	11	27	33	13	11
Flint Hills Resources	Rosemount, Minnesota	323,000	Yes	6	13	205	215	6	13	205	212
Murphy Oil USA Inc.	Superior, Wisconsin	33,250	Yes	0	1	18	8	0	1	18	8
ExxonMobil Refining & Supply Co.	Joliet, Illinois	240,000	Yes	175	45	47	170	175	45	47	170
Citgo Petroleum Corp.	Lemont, Illinois	158,650	Yes	0	0	143	149	0	0	143	149
BP PLC	Whiting, Indiana	405,000	Yes	64	45	28	57	55	45	27	57
Marathon Petroleum Co.	Robinson, Illinois	192,000	Yes	57	38	5	13	3	0	2	4
WRB Refining LLC	Wood River, Illinois	306,000	Yes	44	49	82	70	2	0	82	70
Countrymark Cooperative	Mt. Vernon, Indiana	23,500		0	1	0	0	0	1	0	0
Marathon Petroleum Co.	Catlettsburg, Kentucky	222,000	Yes	100	90	2	2	2	1	2	2
Marathon Petroleum Co.	Canton, Ohio	73,000	Yes	16	9	11	11	3	4	10	10
Husky Energy Corp.	Lima, Ohio	161,500	Yes	0	1	0	29	0	1	0	29
BP PLC	Toledo, Ohio	160,000	Yes	1	5	34	27	1	5	34	27
Sunoco Inc.	Toledo, Ohio	140,000		48	33	38	33	48	30	38	33

TABLE 4.14.3-1 (continued)
Refineries Connected Directly or Indirectly to Enbridge/Lakehead System[a,b,c]

Refinery	Location	Capacity (bpd)	Receive Heavy Oil?[d]	Total Light Imports[e,f] (kbpd)		Total Heavy[g] Imports (kbpd)		Total Light Canadian Imports (kbpd)		Total Heavy[g] Canadian Imports (kbpd)	
				2007	2008	2007	2008	2007	2008	2007	2008
Marathon Petroleum Co.	Detroit, Michigan	100,000	Yes	26	21	42	34	24	20	41	34
United Refining	Warren, Pennsylvania	66,700	Yes	1	3	59	64	1	3	59	64
Imperial Oil	Nanticoke, Ontario	112,000	Yes	NA	NA	NA	NA	NA	NA	NA	NA
Imperial Oil	Sarnia, Ontario	120,800	Yes	NA	NA	NA	NA	NA	NA	NA	NA
Shell Canada	Corunna, Ontario	71,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Suncor Energy Products	Sarnia, Ontario	70,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nova Chemicals (Canada)	Corunna, Ontario	80,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coffeyville Resources	Coffeyville, Kansas	100,000	Yes	0	2	10	13	0	0	8	11
WRB Refining LLC	Borger, Texas	146,000	Yes	11	0	11	22	0	0	11	22
ConocoPhillips	Ponca City, Oklahoma	187,000	Yes	1	9	30	27	1	0	15	12
Frontier Oil Corp.	El Dorado, Kansas	110,000	Yes	4	1	15	20	4	1	15	20
NCRA	McPherson, Kansas	82,700	Yes	0	0	7	5	0	0	7	5
Sinclair Oil Corp.	Tulsa, Oklahoma	70,000	Yes	0	0	1	0	0	0	1	0
Sunoco Inc.	Tulsa, Oklahoma	85,000		0	0	0	0	0	0	0	0
Valero Energy Corp.	Ardmore, Oklahoma	91,500	Yes	30	13	3	0	0	0	0	0
Valero Energy Corp.	Sunray, Texas	166,660	NA	0	0	0	0	0	0	0	0

TABLE 4.14.3-1 (continued)
Refineries Connected Directly or Indirectly to Enbridge/Lakehead System[a,b,c]

Refinery	Location	Capacity (bpd)	Receive Heavy Oil?[d]	Total Light Imports[e,f] (kbpd)		Total Heavy[g] Imports (kbpd)		Total Light Canadian Imports (kbpd)		Total Heavy[g] Canadian Imports (kbpd)	
				2007	2008	2007	2008	2007	2008	2007	2008
Wynnewood Refining Co.	Wynnewood	52,500	Yes	2	0	0	0	2	0	0	0
Total		**1,091,360**									

bpd = Barrels per day.
Kbpd = Thousand barrels per day.
NA = Not available.

[a] Canadian refinery capacities as published in Oil & Gas Journal December 24, 2007.
[b] U.S. refinery capacities as published in the Oil & Gas Journal December 24, 2007.
[c] U.S. Gulf Coast refining capacity is limited to the capacity of the Pegasus pipeline from Patoka, Illinois to Beaumont, Texas.
[d] Information available through U.S. import data from the EIA and Oil & Gas Journal for refinery units.
[e] Information available through the U.S. Energy Information Administration, except for Ontario. Data for 2008 include July.
[f] Data for Ontario include Canadian and foreign imports of crude. Source: CNEB. Data for 2008 include June.
[g] Heavy measurement is less than 30 degrees American Petroleum Institute.

Source: Enbridge 2008a.

It is likely that the refineries actually receiving the Alberta Clipper oil (and the volumes being received) would vary over time based on future long-term and short-term supply and demand conditions. However, at least 15 refineries in Petroleum Administration for Defense District II capable of refining heavy crude oil are connected directly or indirectly to the Enbridge pipeline infrastructure and could theoretically receive oil via the Alberta Clipper Project (Table 4.14.3-1).

In general, these existing refineries are currently capable of receiving and refining substantial volumes of heavy crude oil, including imported oil sands from Canada (See Table 4.14.3-1). The emissions from these existing refineries are authorized by existing air permits that define maximum emissions levels for criteria pollutants. Thus, if the oil transported via the Alberta Clipper Project was entirely transported to existing refineries capable and permitted to refine those volumes of heavy crude oil, there would be little, if any, incremental increase in existing permitted air emissions of the Alberta Clipper Project relative to current permitted conditions. The air permitting process also includes consideration of these emissions in a regional context to avoid significant cumulative impacts to air quality.

Some of these existing refineries have recently been permitted to upgrade their refinery capacities for processing additional heavy crude oil. These include the Marathon Detroit Oil Refinery in Detroit, Michigan; the BP Whiting, Indiana Refinery; and the ConocoPhillips refinery in Roxana, Illinois. Based on the locations and the recent/current increases in heavy crude oil refining capacity, the emissions from these refineries are considered representative of impacts of any incremental increases in emissions related to increasing refining capacity of heavy crude oil in the Midwest for oil potentially transported via the Alberta Clipper Project.

In theory, air emissions associated with the refining of heavy crude oil from oil sands results in greater emissions than those associated with the historical refining of light crude oil. Thus, there could be an incremental increase in actual emissions associated with refining heavy crude oil instead of light crude oil (within permitted limits), especially those associated with existing refineries that have not been recently upgraded or would not be upgraded. In practice, any refineries that are already processing heavy crude oil, including oil sands from Canada, and any refineries that have recently been or would be upgraded to process the heavy crude oil transported via the Alberta Clipper Project have been or would be required to update their permits (which would establish new emission limits) and implement BACT to control and limit emissions. Federal regulations require implementation of current BACT whenever there are major upgrades to refineries; and these same refineries would not be required to implement BACT if they continue historical refining practices, including historical refining of heavy crude oil from Canada. As a result, recent permitted upgrades to allow the processing of heavy crude oil at some refineries in the Midwest have resulted in some emissions increasing and some emissions remaining relatively comparable, while other emission types have decreased relative to historical emissions at those facilities.

In addition, all existing, existing but upgraded, or future refineries must obtain and adhere to air permitting requirements that are designed to limit cumulative impacts to regional air quality to levels that are protective of human health, air quality, and visibility.

Refinery Upgrades

Since it is expected that the oil transported via the Alberta Clipper Project would largely replace current supplies to refineries in the Midwest, refineries that have historically processed heavy crude oil would not be expected to increase air emissions above their currently permitted emission levels. Existing refineries that may increase their actual refining of heavy crude oil without upgrades could result in incremental increases in emissions, but within permitted thresholds designed to avoid significant impacts to air quality (or be required to re-initiate the air permitting process to avoid significant impacts). Refineries that are considering upgrading their facilities, but have not formally proposed upgrades, may theoretically be of

interest; but they typically have no publicly available projected emission estimates or permitted emission levels. Therefore, the best quantitative estimates of incremental increases in emissions associated with the refining of oil transported via the Alberta Clipper Project may be associated with Midwest refineries that have recently completed permitting to upgrade their facilities in order to refine additional heavy crude oil.

In the Midwest, at least three major refineries have recently received permits to upgrade their facilities to refine relatively large volumes of heavy crude oil. These include the Marathon Detroit Oil Refinery, the BP Whiting Indiana Refinery, and the ConocoPhillips Roxana refinery in Illinois.

Together, these refineries are in the process of increasing their overall capacity for refining heavy crude oil by approximately 480,000 bpd (the capacity of the Alberta Clipper Project, as proposed, would be 450,000 bpd). As part of the permitting process for these three refineries, maximum emissions of certain criteria pollutants, and in some cases of GHG, have been identified.

Marathon Detroit Oil Refinery. On June 20, 2008, the Michigan Department of Environmental Quality (MDEQ) issued an air permit to upgrade Marathon Oil Corporation's Detroit refinery. Construction of the Detroit Heavy Oil Upgrade Project commenced immediately following permit issuance and is projected to be completed in the fourth quarter of 2010 (MPC 2008). However, a reduction in gasoline demand, coupled with a delay in Marathon's Canadian crude production, has pushed the completion date to mid-2012. The construction that began in June 2008 has not stopped but is continuing at a slower pace (Oil & Gas Journal 2009). This project will increase the refinery's total capacity from 102,000 to 115,000 bpd, including the resulting capacity to refine an additional 80,000 bpd of heavy crude oil.

The MDEQ found that there will be no significant net emission increase above the past actual baseline emissions for any criteria pollutants with the Detroit Heavy Oil Upgrade Project. Although the project will increase carbon monoxide (CO) emissions, Marathon was able to mitigate CO emissions with catalytic oxidation beds and by accepting lower CO emission limits in the permit.

Decreased emissions for certain other pollutants, including PM_{10}, sulfur dioxide (SO_2), nitrogen oxides (NO_x), CO, and VOCs will occur because of upgrades to equipment and operational changes within the existing refinery (Table 4.14.3-2). The net emissions increase as a result of the Detroit Heavy Oil Upgrade Project will be less than the significance thresholds for all criteria pollutants (MPC 2007).

The MDEQ addressed climate change in its decision to issue the air quality permit. GHG generation increases as energy consumption increases. Heat integration and heat recovery will be improved at several units at the refinery, and the new units will be energy efficient. The project proposes to improve energy efficiency compared to the existing refinery's operations, but total energy use will increase due to the increased capacity to refine heavy crude oil. The energy efficiency steps taken by Marathon will partially mitigate GHG emissions, but the Detroit Heavy Oil Upgrade Project will result in increased GHG emissions.

TABLE 4.14.3-2 Potential to Emit of Criteria Pollutants for Marathon Detroit Oil Refinery		
Pollutant	**Significance Level (tons per year)**	**Estimated Net Increase (or Decrease) in Emissions (tons per year)**
Particulate matter (PM)	25	0.01
PM_{10} (10 microns or less)	15	-11.1
Sulfur dioxide (SO_2)	40	-0.8
Nitrogen oxides (NO_x)	40	-0.5
Carbon monoxide (CO)	100	84.6
Volatile organic compounds (VOC)	40	-1.5

Source: MDEQ 2008.

BP Whiting, Indiana Refinery. On May 1, 2008, the Indiana Department of Environmental Management (IDEM) issued an air permit to upgrade BP's Whiting Refinery. Construction of the BP Whiting Refinery Modernization Project commenced shortly after permit issuance and is projected to be completed in 2012 (BP America 2009). This project will allow the BP Whiting Refinery to refine an incremental increase of 260,000 bpd of heavy crude oil.

Based on available emission estimates, BP will lower its overall air emissions for the refinery after completion of the BP Whiting Refinery Modernization Project. To offset the projected emission increases of the project, BP has already installed pollution controls in recent years. As integral parts of this project, BP will also replace existing equipment with more modern technology and will install emission controls on upgraded and existing units.

The project emission increases and net emission increases are provided in Table 4.14.3-3. BP is decreasing its overall emissions. BP has accepted several operational and emission limits to maintain its emissions below these levels.

In October 2008, EPA issued a Notice of Violation to BP, indicating that BP had not obtained the valid permits for the expansion project (EPA 2008a). Further permitting efforts could alter emission estimates and any subsequent permitted emission levels.

TABLE 4.14.3-3 Potential to Emit of Criteria Pollutants for BP Whiting, Indiana Refinery (tons per year)							
	PM	PM_{10}[5]	SO_2	VOC[6]	CO	NO_x	Pb
Project emissions increase	138.9	216.7	277.7	225.6	541.8	456.7	0.041
Net emissions increase (NEI) with past contemporaneous increases and decreases	-17.5	60.5	(see footnote) ***	239.0	602.2	538.6	-0.02
Net emissions increase / (decrease) (NEI) with future contemporaneous decreases related to CXHO (phased construction) [1, 4]	-204.2	-5.0	(see footnote) ***	163.9	351.6	18.7	-0.02
Net emissions increase/(decrease) (NEI) with future Contemporaneous decreases – non-CXHO (phased shutdown) [1]	-281.9	-1.6	(see footnote) ***	-6.3	-23.7	-28.9	-0.02
Total for modification after netting [2]	-281.9	-41.6	(see footnote) ***	-6.3	-23.7	-28.9	-0.02
Significant level of major source threshold	25	15	40	25	100	40	0.6

*** = SO_2 emissions decrease.

CO = Carbon monoxide.
NO_x = Nitrogen oxides.
Pb = Lead.
PM = Particulate matter.
PM_{10} = Particulate matter (10 microns or less).
SO_2 = Sulfur dioxide.
VOC = Volatile organic compounds.

[1, 2, 3, 4, 5, 6] – Refer to First Significant Source Modification to Part 70 Permit No. T089-6741-00453.

Source: Permit No. T089-6741-00453, First Significant Source Modification.

ConocoPhillips Refinery in Roxana, Illinois. In September 2008, the Illinois EPA issued an air permit to upgrade ConocoPhillips' Wood River Refinery. Construction of the Coker and Refinery Expansion (CORE) Project commenced shortly after permit issuance and is projected to be completed in 2011 (Energy Business Review 2008, Downstream Today 2009). The project will allow the ConocoPhillips' Wood River Refinery to refine an incremental increase of 140,000 bpd of heavy crude oil and will include other capacity changes.

By implementing BACT, ConocoPhillips will lower its air emissions for the refinery for all pollutants except for CO and volatile organic matter (VOM). Emissions of other pollutants will be reduced as part of the CORE Project. The project emission increases and net emission increases are shown in Table 4.14.3-4 (IL EPA 2007).

TABLE 4.14.3-4 Potential to Emit of Criteria Pollutants for ConocoPhillips-CORE Project[a] (tons per year)								
	NO_x (PSD)	NO_x (NA NSR)	CO	SO_2	VOM	PM	PM_{10}	$PM_{2.5}$[b]
Refinery CORE increases	986.7	948.6	1,039.1	1,548.3	329.0	319.2	224.8	224.8
Terminal CORE increases	9.5	9.5	23.8	0.0	54.0	10.0	1.9	1.9
Refinery CORE decreases (shown as negative values)	-1,043.7	-1,043.7	-15.5	-11,131.4	-0.3	-131.3	-131.3	-131.3
Creditable contemporaneous emission increases	775.4	896.6	171.3	148.8	140.8	53.7	53.7	53.7
Creditable contemporaneous emission decreases (shown as negative values)	-732.6	-822.9	-288.4	-1,733.6	-116.5	-396.0	-381.2	-398.6
Net emissions increase (or decrease)	-4.7	-11.9	930.3	-11,167.9	407.0	-144.4	-232.1	-249.5

CO = Carbon monoxide.
NA NSR = Not applicable to New Source Review.
NO_x =Nitrogen oxides.
PM = Particulate matter.
PM_{10} = Particulate matter with a diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with a diameter of 2.5 microns or less.
PSD = Prevention of Significant Deterioration.
SO_2 = Sulfur dioxide.
VOM = Volatile organic matter.

[a] Annual emissions of the project include the Wood River Products Terminal.

[b] Emissions of $PM_{2.5}$ in this table are expressed as emissions of PM_{10}, which is being used as a surrogate pollutant.

Source: IL EPA 2007.

Air dispersion modeling indicated that the project will have an insignificant impact on CO concentrations (IL EPA 2007). BACT was applied to all new and modified emission units, including affected process heaters, fluidized catalytic cracking units, flares, thermal oxidizers, and the loading racks. Emission limits of CO were established for each of these units. An additional impacts analysis was also required by PSD regulations. The project is not expected to adversely affect visibility.

To offset increases in VOM emissions, ConocoPhillips is required to provide 440.1 tpy of emissions offsets from other sources within the St. Louis/Metro-East nonattainment area. A lowest available emission rate (LAER) demonstration for VOM is also required for all new and modified emission units, including affected process heaters, fluidized catalytic cracking units, flares, thermal oxidizers, loading racks, storage tanks, wastewater treatment, and components. Emission limits of VOM were established for each of these units.

Other Refinery Upgrades. In addition to these refineries with recently permitted upgrades to increase refining capacities in the upper Midwest, other refineries have publicly announced plans to expand their heavy crude oil refining capabilities but have not formally applied for expansion permits. While some

anecdotal information is available on these possible expansions, little or no quantitative information is available on associated emissions. These include expansion of the Murphy Oil Refinery in Superior, Wisconsin, and the BP-Toledo Refinery in Ohio. It has been reported that the Murphy Oil Refinery expansion would increase the capacity of the refinery from 35,000 to 235,000 bpd, and all of the increased capacity would be for refining heavy crude oil. Murphy Oil has not submitted any air permit applications; thus, no quantitative information on potential emissions is available. As mentioned above, the project is on indefinite hold while Murphy Oil seeks a business partner to provide the heavy crude oil (Superior Telegram 2008). At this time, no specific information is available with respect to anticipated post-modification emissions. The BP-Toledo Refinery has publicly announced plans to upgrade the refinery to process approximately 170,000 bpd of heavy crude oil (BP America 2007) but has not submitted any permit applications. If these expansion plans were implemented, each of the refineries would submit to the air quality permitting process, which would involve developing approved emission estimates intended to protect human health and the environment, including consideration of cumulative impacts to air quality.

Summary. If it is assumed that the heavy crude oil transported via the Alberta Clipper Project would not replace existing heavy crude oil supplies and that refineries would need to upgrade to handle the volume of the Alberta Clipper Project, it is possible to estimate the incremental increase in emissions associated with this volume at upgraded refineries. Based on the cumulative net emissions from the three refinery upgrades, it is expected that the emissions associated with the 450,000 bpd transported via the Alberta Clipper Project could increase CO emissions by approximately 1,000 tpy, increase VOC emissions by approximately 400 tpy, and decrease emissions of other pollutants based on increased efficiency and improved controls. These estimated results are based on the specific refinery upgrade projects. Cumulative emissions from refining the oil at other refineries would not necessarily be similar to the emissions from refining the oil at the Marathon Detroit, BP Whiting, and ConocoPhillips Roxana refineries. Emissions from refining the oil at other refineries would depend on the process and pollution control equipment used at those unspecified refineries.

New Refineries

In addition to the upgrades to existing refineries in Petroleum Administration for Defense District II, a new refinery proposed in South Dakota is called the Hyperion Energy Center. If approved and constructed, this refinery would be the first new refinery built in the United States in 30 years. The proposed refinery is currently undergoing the permitting review, and on June 3, 2008, Union County, South Dakota voters approved a referendum changing zoning for the Energy Center site from agriculture to a planned development, which was considered a major hurdle in the approval process for the project. The approximately 48-month construction phase would begin in 2010, with full operation beginning in 2014 (Downstream Today 2008).

As proposed, the facility could refine up to 400,000 bpd of heavy crude oil. The refinery would be located hundreds of miles from the Alberta Clipper Project route, and it would not be connected via pipeline to the Alberta Clipper Project or any other identified pipeline based on current information. However, the available information from the air permitting application for the Hyperion Refinery provides another example of the relative magnitude of emissions that may result from refining heavy crude oil from oil sands. Based on the current air permitting application for Hyperion, annual emissions would total approximately 17.2 million metric tons of CO_2, 1,999 tons of CO, 773 tons of NO_x, 1,046 tons of PM, 863 tons of SO_2, and 473 tons of VOCs (SDNR 2008).

Water Discharges

Depending upon the source, heavy crude oils may contain higher concentrations of heavy metals, nitrogen, and sulfur compared to light oil. Processing the heavy crude oil may require upgrades to the refineries' wastewater treatments systems to meet discharge limitations of the NPDES permits under which wastewater discharges are permitted.

Recent refinery upgrades have required reassessment of NPDES permits. For the Detroit Heavy Oil Upgrade Project, Marathon will install $50 million in new wastewater treatment equipment (Michigan Environmental Council 2007). Marathon has agreed to continue to meet discharge quality requirements in its existing NPDES permit. For the BP Whiting refinery, BP agreed to keep pollutant discharges within the limits of the original permit. Enhanced pollution controls associated with the Whiting Refinery Modernization Project will include a new sour water stripper, increased stormwater storage capacity, desalter brine treatment, more efficient final water filters, and other wastewater reduction projects. These measures are designed to ensure that wastewater and stormwater discharges meet NPDES permit limitations and protect the quality of the receiving waters.

Based on these examples, existing refineries that upgrade to increase their capacity to refine heavy crude oil can do so without increasing pollutants in water discharges. New refineries or other existing refineries that propose upgrades would be required to satisfy NPDES discharge requirements to avoid significant impacts to water quality.

End Use

The end use of refined petroleum products could include combustion (e.g., vehicles, power generation, or other industrial facilities) or non-combustion uses (e.g., motor oils or other lubricants). The volume of crude oil that would be transported via the Alberta Clipper Project would total about 3 percent of the crude oil processed in the United States. Neither Enbridge nor DOS would control the destination of the oil or the ultimate refined product. In addition, it is expected that neither the source nor the volume of oil transported via the Alberta Clipper would influence the ultimate type(s) of petroleum products refined. As a result of the refining process, the emissions associated with the end use of the oil by the consumer are not expected to be influenced by the source oil. Thus, the emissions associated with the ultimate use of the refined product would not differ from those end use emissions from other source oils.

Independent of source, the criteria pollutant emissions from consumer and manufacturing use of refined petroleum products are regulated under permits for some uses (e.g., mass transportation vehicles and petrochemical processing) and not for others (e.g., private vehicles) beyond standard quality rules designed to reduce pollutants (e.g., oxygenated fuels and low-sulfur diesel).

While there is no basis to expect that GHG emissions by end users would be influenced by the source oil, GHG emissions from end uses of refined products are not regulated by the federal government or most states.

Greenhouse Gas Emissions

Currently, no rules or regulations have been promulgated by any federal or state agency to define as "significant" any source of GHG emissions. There are also no currently applicable facility-specific emission limitations or caps for GHG emissions. Thus, there is no regulatory or guidance mechanism for determining standards of significance for GHG impacts, including General Conformity thresholds. However, on March 10, 2009, EPA proposed a rule making requiring suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and all facilities that emit 25,000 metric tons or more per

year of GHG emissions to submit annual reports to EPA. While the proposed Alberta Clipper Project would not be required to comply with the rule since it would not approach these thresholds, other projects discussed in this EIS would be subject to the rule and its reporting requirements.

With regard to state GHG programs, North Dakota has not yet adopted any guidelines for reducing GHG. In Minnesota, the governor signed into law the 2007 Next Generation Energy Act. This law builds on the state's nation-leading energy policies of more renewable energy, more energy savings, and lower carbon emissions and specifies the development of a comprehensive plan to reduce Minnesota's GHG emissions. The Minnesota Climate Change Advisory Group prepared a Climate Mitigation Action Plan for presentation to the governor and the legislature. The plan contains nine policy recommendations for reducing GHG emissions; none directly pertain to oil pipelines.

In April 2007, the governor of Wisconsin signed EO 191 that created a group of key Wisconsin business, industry, government, energy, and environmental leaders known as the Task Force on Global Warming. The Task Force was charged with creating a state plan to reduce GHG emissions. In July 2008, the Task Force voted to finalize its report, *Wisconsin's Strategy for Reducing Global Warming*. The report includes goals for reducing GHG emissions as follows: (1) a return to 2005 levels no later than 2014; (2) a 22-percent reduction from 2005 levels by 2022; and (3) a 75-percent reduction from 2005 levels by 2050.

According to the Association of Environmental Professionals, there are currently no published thresholds or recommended methodologies for determining the significance of a project's potential cumulative contribution to global climate change (Hendrix et al. 2007). Even very large individual projects do not generate sufficient GHGs to individually influence global climate change. Nevertheless, there is a general scientific consensus that the cumulative effects of GHG have led to climate change on a global scale, which is considered a significant cumulative effect.

The principal GHG of concern related to crude oil pipeline construction and operation is CO_2, which enters the atmosphere through the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, and trees and wood products, and as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Other GHGs include methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

As stated previously, GHG emissions during construction of the Alberta Clipper Project (and the Superior Terminal Expansion Project) would directly total approximately 27,000 metric tons, primarily associated with the operation of diesel-powered equipment (indirect emissions cannot be meaningfully quantified). Operations of the Alberta Clipper Project would result in relatively little direct emissions and they would be due to periodic operation of inspection vehicles and fugitive emissions (up to 0.5 ton of VOC per year). Indirect GHG-related emissions during operation would be associated with electrical generation for the pump stations (approximately 0.3 million metric tpy). Thus, the construction and operation of the Alberta Clipper Project would incrementally increase GHG emissions.

Refining of the oil transported by the Alberta Clipper Project would also emit GHGs. Refining at existing refineries that are not upgrading to increase their capacity for processing heavy crude oil would not be expected to cause a substantial increase in GHG emissions relative to those associated with refining heavy crude oil currently. GHG emissions from upgraded refineries or new refineries would represent an incremental increase in GHG.

Comprehensive information on GHG emissions from refineries in general is not available, but there is some information on the relative magnitude of incremental GHG emissions relative to refinery upgrades

and literature on the carbon emissions for refining a barrel of oil. For the BP Whiting Indiana Refinery, BP reports that the upgrade project will result in a 30- to 40-percent increase in CO_2 emissions for the refinery, resulting in an incremental increase in CO_2 emissions up to 0.5 million tpy (total emissions up to 2 million tpy) based on current estimates. Since the BP Whiting refinery upgrade would increase the capacity to refine heavy crude oil by approximately 260,000 bpd, applying this value to the volume transported by the Alberta Clipper Project indicates that the incremental increase in GHG emissions represented by the Alberta Clipper Project could be up to about 0.9 million tpy. As mentioned previously, emission estimates from specific refineries are refinery specific, and emission rates at different refineries could vary broadly.

Information also is available on the total GHG emissions associated with refining a barrel of heavy crude oil independent of a specific refinery. A report by the University of Toronto (2008) estimates that refining one barrel of heavy crude oil from oil sands emits a total of 47.4 kilograms of carbon, including the refining process itself and energy generation for the refining process. Applying these values to the volume transported by the Alberta Clipper Project indicates that carbon emissions from refining could total up to 7.8 million metric tpy.

Similarly, preliminary estimates by the Natural Resources Defense Council (NRDC 2008) indicate that GHG emissions from refining heavy crude oil from oil sands would apparently range from approximately 9.4 to 31.5 kilograms per barrel. Applying these values to the Alberta Clipper Project indicates that total GHG emissions for refining the volume proposed for the Alberta Clipper Project could range from 1.5 to 5.2 metric tpy.

As a third example, Marathon reports that GHG emissions for all their refining operations total approximately 33 kilograms per barrel of oil (Marathon 2006), which falls between the range of values reported by the University of Toronto and NRDC. Applying the Marathon value to the Albert Clipper volume indicates that GHG emissions could total 5.4 million metric tons.

Based on these values, refining the oil transported by the Alberta Clipper Project would result in total carbon emissions in the range of 1.5 to 7.8 million metric tpy if one assumes that every single barrel transported via the Alberta Clipper Project would be in addition to the current supply. It is likely that the actual incremental increase would be significantly less since it is expected that the oil transported via the Alberta Clipper Project would largely replace oil from other sources, including other heavy crude oil sources. If this heavy crude oil replaced existing light crude oil, there could be some incremental increases in emissions and emission rates would be dependent on refinery-specific permitted thresholds, potential upgrades and implementation of BACT, etc. From a global perspective, it is expected that the oil sands in Canada would continue to be developed and the refinery emissions from that oil would still occur whether in Canada, the United States, or overseas even if the Alberta Clipper Project were not built.

For context, the total GHG emissions for the United States (CO_2 equivalents from anthropogenic activities) totaled 7,054 million metric tons in 2006, and global CO_2 emissions totaled 28,193 million metric tons in 2005 (CO_2 equivalents from fuel combustion) (EPA 2008b), therefore refining of the heavy oil transported via the Alberta Clipper Project represents up to 0.001 and 0.0003 percent of the national and global GHG emissions, respectively. Construction activities associated with the proposed Project would result in 27,276 tons (0.027 million metric tons [see Table 4.12.1-4]) of CO_2 equivalents, which represents 0.0004 and 0.0001 percent of the national and global GHG emissions, respectively. Nearly all construction emissions would occur in Minnesota, where construction emissions of GHG for the proposed Project represent 0.02 percent of the GHG emissions inventory in Minnesota (estimated at 163.8 million metric tons in 2010 [CCS 2008]). For context, the GHG emissions inventory for Wisconsin was 123.1 million metric tons in 2003 (CO_2 equivalents from anthropogenic activities) (WRI 2008). The GHG emissions inventory for North Dakota was not available at the time of this EIS.

While there are no federal regulations or guidance to definitively identify the significance of the GHG emissions associated with operation of the Alberta Clipper Project, the amount of GHG emissions from Alberta Clipper operations (0.3 million metric tons) would not constitute a substantial contribution to the emissions from specific refineries (as discussed above), total U.S. emissions, or global emissions.

In general, the mitigation measures implemented as part of the Alberta Clipper Project following construction would serve to offset some of the GHG emissions associated with the proposed Project. These measures would include revegetation of the construction work areas, restoration of wetland functions, and compensatory wetland mitigation for wetland impacts. Specific revegetation measures would be coordinated with land managers, NRCS, and landowners. LLBO indicates that Enbridge has agreed to reseed construction areas with native species specifically found to sequester atmospheric carbon to further offset GHG impacts. Minimal direct GHG emissions would be associated with operation (e.g., vehicle operation and fugitive emissions), and indirect emissions would be associated with electrical generation for the pump stations.

At the request of EPA, Enbridge has identified voluntary measures that Enbridge is implementing or would implement to reduce GHG emissions. From a system-wide perspective (oil and gas pipelines), Enbridge has initiated measurement of GHG emissions, replaced older pipe with cast iron pipe, replaced compressor seals and documented reductions in subsequent fugitive emissions from natural gas pipelines, expanded the use of "cold weather" technology to reduce fuel needs for heating natural gas, and investigated geothermal and solar energy technologies to replace gas-fired boilers. From a corporate perspective, Enbridge has implemented voluntary measures to reduce or offset GHGs, including development of wind power projects, initiating fuel cell pilot studies powered by recovered gas from their pipeline system, initiating a carbon sequestration project, and participating in EPA's STAR program.

Finally, the potential impacts of climate change would not be expected to affect the proposed Project. An increase in temperatures may increase wildfires in the Project area. An increased intensity of storm events, should this occur, may result in additional flooding in some areas near the Project. The Project would be designed to the appropriate standards; however, as discussed in Section 4.13, it would not be subject to new types of impacts that would not be accounted for in the Project design and the plans that are proposed. Other effects of climate change, such as air quality degradation, health effects, reduced snow pack, and agricultural issues, would not impact the proposed Project.

4.14.3.13 Reliability and Safety

The Alberta Clipper pipeline would largely be collocated with an existing Enbridge pipeline right-of-way. It would also be collocated with the Diluent Project between the Clearbrook Terminal and the Superior Terminal. In addition, the Alberta Clipper pipeline would cross or be collocated with other non-Enbridge pipelines for limited areas. Cumulative impacts could be incurred should incidents occur on one or more collocated pipelines within the same time frame. Large release events are rare; therefore, the likelihood of major events occurring in the same general area within two separate pipeline systems is remote. As described in Section 4.13, Enbridge is required to comply with DOT and state and local regulations regarding pipeline safety, leak detection, and spill response.

The Alberta Clipper pipeline also would be collocated with the Great Lakes Gas pipeline for a small part of its route. Because the Great Lakes Gas pipeline would transport natural gas rather than any type of liquid material, cumulative effects caused by spills and leaks of crude oil are not expected from the two collocated pipelines.

4.14.4 Watershed-Based Cumulative Impacts Analysis

A watershed-based cumulative impacts analysis was conducted at the request of the COE to assess potential impacts within individual watersheds along the proposed Alberta Clipper Project route. This watershed-based analysis consisted of identifying land uses within each watershed and determining the impacts to them associated with the Alberta Clipper Project, other large-scale projects in the ROI, and small-scale projects within each watershed. The approach was comparable to the watershed-based cumulative impacts analysis presented in the LSr EA (Enbridge 2008b). The cumulative impacts analysis in the LSr EA included the impacts associated with the existing Enbridge pipelines, the LSr pipeline, and the Alberta Clipper pipeline from the U.S./Canada border in North Dakota to Clearbrook, Minnesota. The following cumulative impacts analysis presents that information for the northerly portion of the proposed Alberta Clipper route as well as comparable information for the watersheds between Clearbrook, Minnesota and Superior, Wisconsin. Baseline and existing land use numbers impacted by the existing Enbridge pipelines, the LSr pipeline, and the Alberta Clipper pipeline were provided by Enbridge for examination and incorporation into this cumulative impacts analysis.

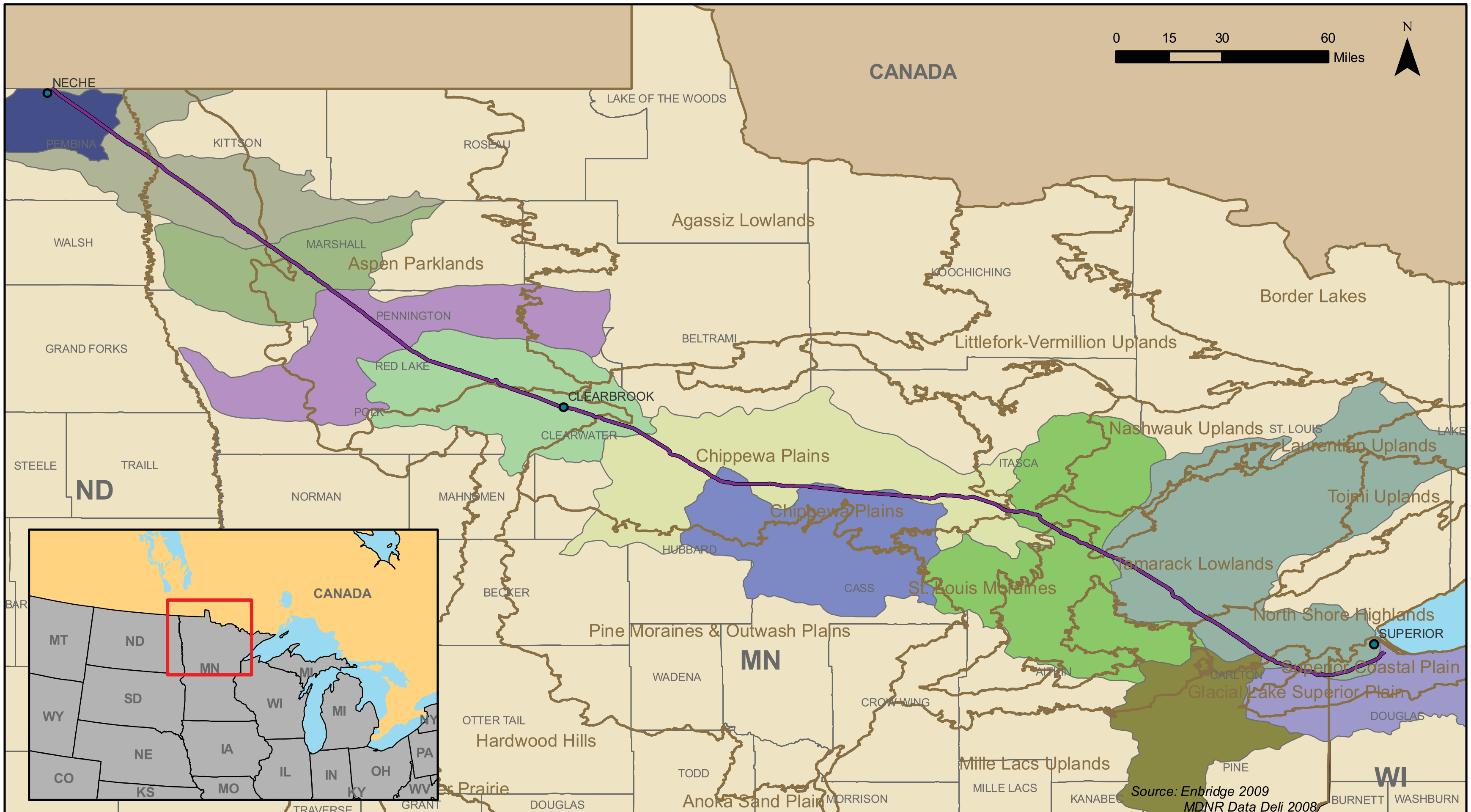
4.14.4.1 Environmental and Geopolitical Context for the Proposed Alberta Clipper Project

The proposed Alberta Clipper route was compared to relevant hydrologic, ecological, and political boundaries to put the proposed Project into a management unit context (watershed and ecology based).

Watersheds were identified along the Alberta Clipper Project route based on hydrologic unit and subbasin watershed (USGS 2008) and Minnesota Ecological Classification System (ECS) subsection level. This analysis resulted in identification of 11 watersheds that would be crossed by the Alberta Clipper Project between the Pembina River Watershed in northeastern North Dakota and the Beartrap-Nemadji River Watershed in northwestern Wisconsin.

FWS and the MDNR developed the ECS for ecological mapping and landscape classification. The system follows the National Hierarchical Framework of Ecological Units; ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (Cleland et al. 1997). ECS subsections within the proposed route traversed by the Alberta Clipper Project include Red River Prairie, Aspen Parklands, Hardwood Hills, Chippewa Plains, St. Louis Moraines, Tamarack Lowlands, Glacial Lake Superior Plain, Mille Lacs Uplands, North Shore Highlands, and the Superior Coastal Plain (Figure 4.14.4-1) (MDNR 2008a, WDNR 2006).

The proposed Alberta Clipper Project crosses portions of 11 watersheds, 9 subsections designated in the Minnesota ECS, one ecological landscape as designated by WDNR, 15 counties, and two Indian reservations (LLR and FDL Reservation). The general location of the proposed Project relative to watersheds, counties, and ECS subsections is provided in Figure 4.14.4-1. Table 4.14.4-1 identifies the total acreage in the watershed, percent of watershed area affected by the pipeline, milepost increments, and crossing length for each of the watersheds, ECS subsections, counties, and reservations that would be crossed by the Alberta Clipper Project.



Legend

- Alberta Clipper Pipeline
- ECS Subsection*

Watershed

- Pembina River
- Lower Red River
- Snake River
- Red Lake River
- Clearwater River
- Mississippi River Headwaters
- No Name Given / Leech Lake River
- Prairie-Willow
- Kettle River
- St. Louis River
- Beartrap-Nemadji River

*ECS Subsections are exclusive to Minnesota. Wisconsin has a similar classification system called Ecological Landscape.

ALBERTA CLIPPER PROJECT

FIGURE 4.14.4-1 WATERSHEDS AND ECS SUBSECTIONS

TABLE 4.14.4-1
Watersheds and Geopolitical Boundaries Crossed by the Alberta Clipper Project[a, b]

Watershed Name/Indian Reservation Name	MDNR/WDNR ECS	County	Area in Watershed (thousands of acres)	Percent of Watershed Area (%)	Milepost Increments[c]	Crossing Length (miles) (percent of state route [%])
NORTH DAKOTA						
Lower Red River	-	Pembina	189.47	94.1	773.8 – 774.7	0.9 (3.2)
	-				790.1 – 801.8	11.7 (41.8)
	-	Walsh	11.86	5.9	-	-
	Subtotal		*201.34*	*100.0*		*12.6 (44.9)*
Pembina River	-	Pembina	330.04	27.2	774.7 – 790.1	15.4 (55.1)
	-	Cavalier	620.41	51.2	-	-
	-	Towner	237.39	19.6	-	-
	-	Rolette	23.74	2.0	-	-
	Subtotal		*1,211.5*	*100.0*		*15.4 (55.1)*
Total North Dakota			**1,430.55**			**28.0 (8.6)**
MINNESOTA						
Lower Red River	Red River Prairie	Kittson	230.23	39.6	801.8 – 817.0	15.4 (5.4)
		Marshall	131.09	22.5	817.0 – 834.0	16.8 (6.0)
	Subtotal		*361.32*	*62.1*	*801.8 – 834.0*	*32.4 (11.3)*
	Aspen Parklands	Marshall	135.06	23.2	-	-
		Kittson	79.39	13.6	-	-
		Roseau	5.95	1.1	-	-
	Subtotal		*220.40*	*37.9*	-	-
Lower Red River Watershed Subtotal			***581.72***	***100.0***		***32.4 (11.4)***
Snake River	Aspen Parklands	Marshall	283.30	47.5	833.9 – 851.6	18.0 (6.3)
		Pennington	12.27	2.1	-	-
		Polk	37.29	6.3	-	-
	Subtotal		*332.85*	*55.8*		*18.0 (6.3)*
	Red River Prairie	Marshall	190.27	31.9	-	-
		Polk	73.36	12.3	-	-
	Subtotal		*263.64*	*44.2*	-	-
Snake River Watershed Subtotal			***596.49***	***100.0***		***18.0 (6.3)***
Red Lake River	Aspen Parklands	Marshall	14.61	1.6	851.6 – 851.7	0.1 (0.04)
		Pennington	327.90	36.3	851.7 – 871.4	19.7 (6.9)
		Red Lake	97.54	10.8	871.4 – 873.9	2.6 (0.9)
		Polk	111.75	12.4	-	-
		Beltrami	6.90	<0.1	-	-
		Clearwater	1.40	<0.1	-	-
	Subtotal		*560.10*	*62.1*		*22.4 (7.8)*
	Red River Prairie	Polk	179.81	19.9	-	-
	Agassiz Lowlands	Beltrami	104.77	11.6	-	-
		Clearwater	54.32	6.0	-	-
		Pennington	2.71	<0.1	-	-
		Marshall	0.10	<0.1	-	-
	Subtotal		*161.91*	*17.9*	-	-
	Hardwood Hills	Polk	0.56	<0.1	-	-

TABLE 4.14.4-1 (continued) Watersheds and Geopolitical Boundaries Crossed by the Alberta Clipper Project[a, b]						
Watershed Name/Indian Reservation Name	**MDNR/WDNR ECS**	**County**	**Area in Watershed (thousands of acres)**	**Percent of Watershed Area (%)**	**Milepost Increments[c]**	**Crossing Length (miles) (percent of state route [%])**
MINNESOTA (continued)						
Red Lake River Watershed Subtotal			***902.38***	***100.0***		***22.4 (7.8)***
Clearwater River	Aspen Parklands	Red Lake	179.13	20.4	873.9 – 886.9	13.0 (4.6)
		Polk	114.60	13.1	886.9 – 896.2	9.7 (3.4)
		Clearwater	51.06	5.8	-	-
		Pennington	31.62	3.6	-	-
	Subtotal		*376.41*	*42.9*		*22.7 (7.9)*
	Hardwood Hills	Polk	186.37	21.3	896.2 – 900.5	4.3 (1.5)
		Clearwater	109.84	12.5	900.5 – 915.3	15.0 (5.2)
		Mahnomen	15.58	1.8	-	-
		Beltrami	2.83	0.3	-	-
	Subtotal		*314.62*	*35.9*		*19.3 (6.8)*
	Chippewa Plains	Polk	0.48	0.1	-	-
		Clearwater	101.59	11.6	915.3 – 921.1	5.9 (2.1)
		Beltrami	28.96	3.3	921.1 – 925.6	4.5 (1.6)
		Mahnomen	0.35	<0.1	-	-
	Subtotal		*131.37*	*15.0*		*10.4 (3.6)*
	Agassiz Lowlands	Clearwater	53.82	6.1	-	-
		Pennington	0.01	<0.05	-	-
	Subtotal		*53.83*	*6.1*	-	-
	Red River Prairie	Polk	0.75	0.1	-	-
Clearwater River Watershed Subtotal			***876.98***	***100.0***		***52.4 (18.3)***
Mississippi River Headwaters	Chippewa Plains	Beltrami	399.96	31.7	925.6 – 943.8	18.5 (6.5)
		Cass	150.71	11.9	951.5 – 962.9 971.7 – 974.3 982.5 – 986.0 986.1 – 986.2	11.1 (3.9) 2.7 (0.9) 3.5 (1.2) 0.1 (0.02)
		Clearwater	67.67	5.4	-	-
		Hubbard	130.17	10.3	943.8 – 944.1	0.3 (0.1)
		Itasca	298.31	23.6	986.0 – 986.1 986.2 – 1002.1 1002.6 – 1002.9	0.2(0.1) 15.9 (5.6) 0.3 (0.1)
Leech Lake Reservation	Chippewa Plains	Cass	-	-	951.5 – 962.9 971.7 – 974.3 982.5 – 986.0 986.1 – 986.2	11.06 2.69 3.52 0.05
	Chippewa Plains	Itasca	-	-	986.0 – 986.1 986.2 – 993.9	0.16 7.77
	Reservation Subtotal[d]				-	*25.25[d]*
	Subtotal		*1,046.82*	*82.8*		*52.4 (18.3)*
	Pine Moraines and Outwash Plains	Becker	15.62	1.2	-	-
		Clearwater	33.20	2.6	-	-
		Hubbard	34.94	2.8	-	-

TABLE 4.14.4-1 (continued) Watersheds and Geopolitical Boundaries Crossed by the Alberta Clipper Project[a, b]						
Watershed Name/Indian Reservation Name	**MDNR/WDNR ECS**	**County**	**Area in Watershed (thousands of acres)**	**Percent of Watershed Area (%)**	**Milepost Increments[c]**	**Crossing Length (miles) (percent of state route [%])**
MINNESOTA (continued)						
	Subtotal		*85.76*	*6.6*	-	-
	St. Louis Moraines	Cass	16.31	1.3	-	-
		Itasca	112.90	8.9	1002.1 – 1002.6 1002.9 – 1005.4	0.6 (0.2) 2.46 (0.9)
	Subtotal		*129.21*	*10.2*		*3.1 (1.1)*
	Tamarack Lowlands	Itasca	4.06	0.3	-	-
Mississippi River Headwaters Watershed Subtotal			***1,263.85***	***100.0***		***55.5 (19.4)***
No Name Given / Leech Lake River	Chippewa Plains	Beltrami	5.14	0.6	-	
		Cass	238.19	27.2	951.5 – 951.5 962.9 – 971.7 974.3 – 982.5	0.04 (0.01) 8.7 (3.1) 8.1 (2.8)
		Hubbard	113.82	13.0	944.1 – 951.5	7.6 (2.7)
	Subtotal		*357.15*	*40.7*		*24.5 (8.6)*
Leech Lake Reservation	Chippewa Plains	Cass	-	-	951.5 – 951.5 962.9 – 971.7 974.3 – 982.5	0.04 8.72 8.11
	Chippewa Plains	Hubbard	-	-	944.1 – 951.5	0.61
	Reservation Subtotal[d]				-	*17.48[d]*
	Pine Moraines and Outwash Plains	Cass	186.37	49.6	-	-
		Hubbard	109.84	5.9	-	-
	Subtotal		*487.26*	*55.5*		
	St. Louis Moraines	Cass	32.96	3.8	-	-
No Name Given / Leech Lake River Watershed Subtotal			***876.98***	***100.0***		***24.5 (8.6)***
Prairie-Willow	Chippewa Plains	Itasca	0.48	0.04	-	-
	Nashwauk Uplands	Itasca	185.15	14.2	-	-
		St. Louis	33.70	2.6	-	-
	Subtotal		*218.85*	*16.7*	-	-
	North Shore Highlands	Carlton	3.96	0.3	-	-
		St. Louis	0.47	0.04	-	-
	Subtotal		*4.43*	*0.3*	-	-
	Pine Moraines and Outwash Plains	Cass	18.91	1.5	-	-
	St. Louis Moraines	Aitkin	221.27	16.9	-	-
		Carlton	53.90	4.1	-	-
		Cass	68.84	5.3	-	-
		Itasca	326.21	25.0	1005.6 – 1014.4 1024.2 – 1026.8	9.8 (3.4) 2.5 (0.9)
		St. Louis	13.19	1.0	-	-

TABLE 4.14.4-1 (continued) Watersheds and Geopolitical Boundaries Crossed by the Alberta Clipper Project[a, b]						
Watershed Name/Indian Reservation Name	**MDNR/WDNR ECS**	**County**	**Area in Watershed (thousands of acres)**	**Percent of Watershed Area (%)**	**Milepost Increments[c]**	**Crossing Length (miles) (percent of state route [%])**
MINNESOTA (continued)						
	Subtotal		*683.41*	*52.3*		*12.3 (4.3)*
	Tamarack Lowlands	Aitkin	289.51	22.2	-	-
		Carlton	0.13	0.01	-	-
		<u>Itasca</u>	<u>86.81</u>	<u>6.60</u>	<u>1014.4 – 1024.2</u>	<u>9.9 (3.5)</u>
		St. Louis	4.61	0.40	-	-
	Subtotal		*381.05*	*29.20*		*9.9 (3.5)*
Prairie-Willow Watershed Subtotal			***1,307.13***	***100.00***		***22.2 (7.8)***
St. Louis River	Border Lakes	St. Louis	0.25	0.01	-	-
	Glacial Lake Superior Plain	<u>Carlton</u>	<u>15.45</u>	<u>0.8</u>	<u>1077.7 – 1079.0</u> <u>1083.2 – 1084.8</u>	<u>1.2 (0.4)</u> <u>1.67 (0.6)</u>
		St. Louis	5.07	0.3	-	-
	Subtotal		*20.52*	*1.1*		*2.9 (1.0)*
	Laurentian Uplands	Lake	25.70	1.4	-	-
		St. Louis	110.25	5.9	-	-
	Subtotal		*135.95*	*7.3*	-	-
	Mille Lacs Uplands	<u>Carlton</u>	<u>26.90</u>	<u>1.4</u>	<u>1072.0 – 1077.7</u>	<u>5.9 (2.1)</u>
	Subtotal					<u>*5.9 (2.1)*</u>
	Nashwauk Uplands	Itasca	0.14	0.01	-	-
		St. Louis	196.56	10.5	-	-
	Subtotal		*196.70*	*10.5*	-	-
	North Shore Highlands	<u>Carlton</u>	<u>94.08</u>	<u>5.0</u>	<u>1061.1 – 1069.6</u> <u>1069.7 – 1072.0</u>	<u>8.5 (3.0)</u> <u>2.3 (0.8)</u>
		<u>St. Louis</u>	<u>168.19</u>	<u>9.0</u>	<u>1055.0 – 1061.1</u>	<u>6.1 (2.1)</u>
	Subtotal		*262.27*	*14.0*		*16.9 (5.9)*
Fond du Lac Reservation	North Shore Highlands	<u>Carlton</u>	-	-	<u>1061.1 – 1069.6</u> <u>1069.7 – 1071.6</u>	<u>8.50</u> <u>1.87</u>
	North Shore Highlands	<u>St. Louis</u>	-	-	<u>1058.6 – 1061.1</u>	<u>2.46</u>
	Reservation Subtotal[d]				-	*12.83[d]*
	St. Louis Moraines	Aitkin	2.08	0.1	-	-
		<u>Itasca</u>	<u>28.19</u>	<u>1.5</u>	<u>1026.8 – 1027.4</u>	<u>0.6 (0.2)</u>
		St. Louis	55.77	3.0	-	-
	Subtotal		*86.04*	*4.6*	-	*0.6 (0.2)*
	Tamarack Lowlands	<u>Aitkin</u>	<u>45.00</u>	<u>2.4</u>	<u>1035.4 – 1036.5</u>	<u>1.1 (0.4)</u>
		<u>Itasca</u>	<u>30.58</u>	<u>1.6</u>	<u>1027.4 – 1035.4</u>	<u>8.0 (2.8)</u>
		<u>St. Louis</u>	<u>914.78</u>	<u>49.0</u>	<u>1036.5 – 1055.0</u>	<u>18.6 (6.5)</u>
	Subtotal		*990.36*	*53.0*		*27.7 (9.7)*
	Toimi Uplands	Lake	0.14	0.01	-	-
		St Louis	149.46	8.0	-	-
	Subtotal		*149.60*	*8.0*	-	-

TABLE 4.14.4-1 (continued) Watersheds and Geopolitical Boundaries Crossed by the Alberta Clipper Project[a, b]						
Watershed Name/Indian Reservation Name	**MDNR/WDNR ECS**	**County**	**Area in Watershed (thousands of acres)**	**Percent of Watershed Area (%)**	**Milepost Increments[c]**	**Crossing Length (miles) (percent of state route [%])**
MINNESOTA (continued)						
St. Louis River Watershed Subtotal			***1,868.59***	***100.0***		***54.1 (18.9)***
Kettle River	Glacial Lake Superior Plain	Carlton	0.16	0.02	-	-
	Mille Lacs Uplands	Aitkin	42.37	6.3	-	-
		Carlton	134.43	20.1	-	-
		Kanabec	20.27	3.0	-	-
		Pine	357.10	53.4	-	-
	Subtotal		*554.16*	*82.8*	-	-
	North Shore Highlands	Carlton	28.10	4.2	1069.6 – 1069.7	0.1 (0.04)
Fond du Lac Reservation	North Shore Highlands	Carlton	-	-	1069.6 – 1069.7	0.11
	Reservation Subtotal[d]				-	*0.11[d]*
	St. Louis Moraines	Aitkin	18.04	2.7	-	-
		Carlton	68.47	10.2	-	-
	Subtotal		*86.51*	*12.9*	-	-
Kettle River Watershed Subtotal			***668.93***	***100.0***		***0.1 (0.04)***
Beartrap-Nemadji River	Glacial Lake Superior Plain	Carlton	89.00	53.1	1078.9 – 1083.2	4.2 (1.5)
	Mille Lacs Uplands	Carlton	45.29	27.0	-	-
		Pine	33.43	19.9	-	-
	Subtotal		*78.72*	*46.9*		*4.2 (1.5)*
Beartrap-Nemadji River Watershed Subtotal			***167.70***	***100.0***		***4.23 (1.5)***
Total Minnesota			**9,717.71**	**100.0**		**285.8 (87.4)**
WISCONSIN						
St. Louis River	Superior Coastal Plain	Douglas	43.15	100.0	1084.8 – 1095.8	11.0 (83.4)
	Subtotal		***43.15***	***100.0***	-	***11.0 (83.4)***
Beartrap-Nemadji River	Superior Coastal Plain	Ashland	33.95	6.2	-	-
		Bayfield	303.43	55.3	-	-
		Douglas	211.71	38.5	1095.8 – 1097.8	2.2 (16.7)
	Subtotal		***549.08***	***100.0***		***2.2 (16.7)***
Total Wisconsin			**592.22**	**100.0**		**13.1 (4.0)**
Grand Total						**326.9**

a Acreages and percentages were determined using GIS methods. Ecological Classification System (ECS) subsection boundaries are from the Minnesota Department of Natural Resources (MDNR 2008a), and Ecological Landscapes are from the Wisconsin Department of Natural Resources (WDNR 2006). The Alberta Clipper and Southern Lights Diluent Project routes are collocated within the same construction corridor, would be constructed together, and are thus combined in this analysis. The entire 12.93 miles of the route in Wisconsin are contained in the Superior Coastal Plain, as described in the *Wisconsin Wildlife Action Plan* (WDNR 2006).

b Counties that are underlined would be crossed by the proposed Alberta Clipper Project route.

c Milepost increments are for general Project location and should not be used to determine mileage within each watershed.

d Indian reservation mileage is already accounted for in the watershed subtotal.

4.14.4.2 Pre-Settlement and Baseline Conditions

Available historical data were evaluated to identify long-term changes in land cover. Differences in data sets, such as map scales and inconsistencies among surveys, limited the scope and level of detail that could be provided in a Project-wide comparison of pre-settlement and baseline land uses, resulting in a semi-quantitative assessment.

Pre-settlement land cover data were collected for the proposed Alberta Clipper route from the following sources to cover the entire Project route: Marschner (Minnesota), SSURGO2 (for North Dakota) and original vegetation cover for Wisconsin (Marschner 1974, NRCS 2008, WDNR 1990).

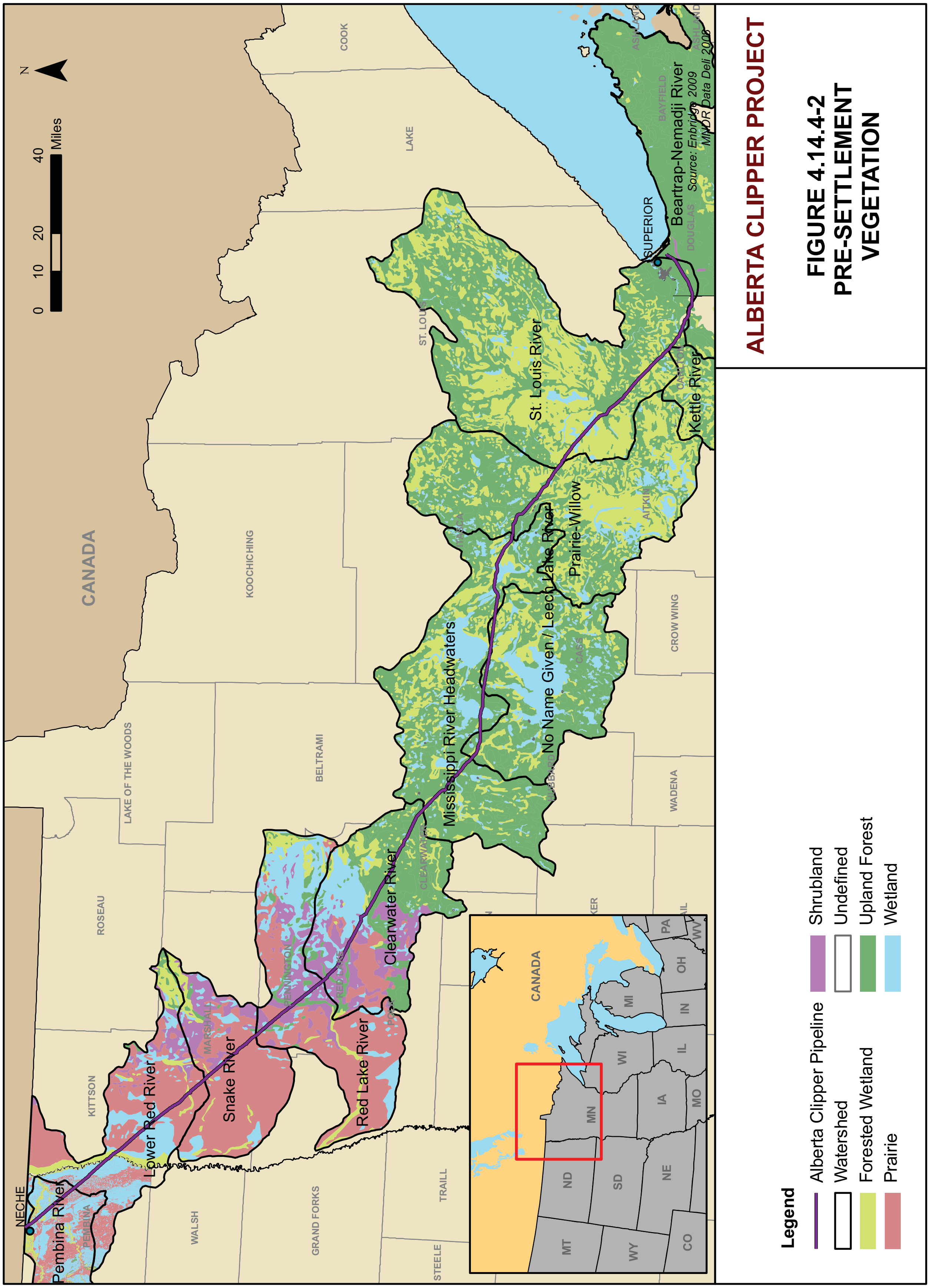
Federal and state regulations to control impacts to wetlands and other natural resources were primarily initiated in the 1970s and generally were implemented in the 1980s. Thus, land cover data from the 1980s provide a convenient baseline from which to evaluate cumulative impacts. Publicly available historical land use data from the 1980s Gap Analysis Program (GAP) analysis were queried in Geographic Information System (GIS) to determine the historical land cover along the proposed Alberta Clipper route (GAP 2008, MDNR Data Deli 2008). Because wetlands data are not accurately captured in the GAP, supplemental National Wetlands Inventory (NWI) data were used to determine the baseline for wetlands (FWS 2008).

The pre-settlement vegetation data (vegetation type prior to settlement by man) (Marschner, SSURGO2; WDNR 1990) were compared to baseline data (GAP and NWI) to infer changes to land use over time as a result of human activity in each watershed affected by the proposed Alberta Clipper Project (Figures 4.14.4-2 and 4.14.4-3).

Surveys in the 1980s indicated that historical agricultural activities were responsible for the majority of wetland loss in years prior. Consequently, government conservation programs were implemented during this period to preserve and restore marginal agricultural land to natural ecosystems (Dahl 2006). Such conservation programs include:

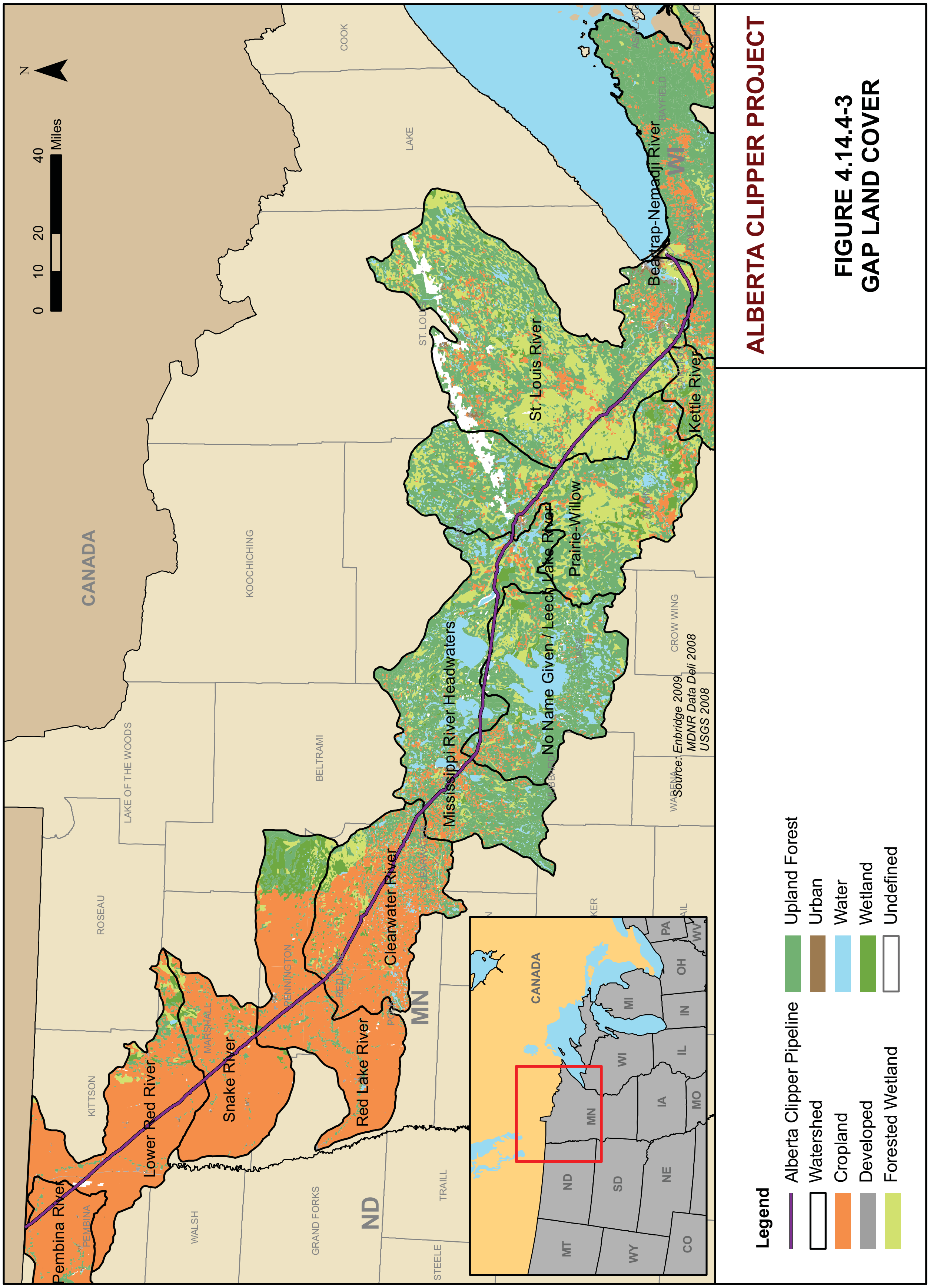
- Voluntary programs such as the CRP and Conservation Reserve Enhance Program (CREP) enable agricultural landowners to receive annual rental payments and cost-share assistance to protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water (FSA 2008).
- The WRP provides payments and cost sharing to farmers in exchange for restoring farmed wetlands permanently or for 30-year contract periods.
- Minnesota's Reinvest in Minnesota (RIM) Program pays landowners to retire marginal lands and drained wetlands from agricultural production through the purchase of permanent easements.
- The Minnesota Wetlands Conservation Act (WCA) requires that anyone wishing to drain or fill a non-exempt wetland must document the unsuitability of avoidance alternatives, minimize impacts, and mitigate for all unavoidable impacts. The act includes a number of options for landowners to receive compensation for protecting wetlands.

The conservation acreages that have been included in these programs during the past two decades were incorporated into the 1980s baseline survey results to estimate current and historical land use in the Project area.



ALBERTA CLIPPER PROJECT

FIGURE 4.14.4-2
PRE-SETTLEMENT VEGETATION


ALBERTA CLIPPER PROJECT
FIGURE 4.14.4-3
GAP LAND COVER
Legend
Alberta Clipper Pipeline
Watershed
Cropland
Developed
Forested Wetland
Upland Forest
Urban
Water
Wetland
Undefined
0 10 20 40 Miles
N
Source: Enbridge 2009
MDNR Data Deli 2008
USGS 2008
CANADA
ND
MN
WI
Pembina River
Lower Red River
Snake River
Red Lake River
Clearwater River
Mississippi River Headwaters
No Name Given / Leech Lake River
Prairie-Willow
St. Louis River
Kettle River
Beartrap-Nemadji River
PEMBINA
KITTSON
ROSEAU
LAKE OF THE WOODS
KOOCHICHING
BELTRAMI
MARSHALL
PENNINGTON
RED LAKE
WALSH
GRAND FORKS
TRAILL
STEELE
COOK
LAKE
CROW WING
WADENA
BAYFIELD
DOUGLAS
CANADA
MT
ND
SD
WY
NE
CO
MN
IA
MO
WI
IL
MI
IN
OH
PA
WV

Changes in vegetation cover resulting from the Alberta Clipper Project then were evaluated on a watershed and ECS subsection level to identify the impacts to land cover from the proposed Project.

4.14.4.3 Other Projects

As described in Section 4.14.2, large-scale projects considered as part of the cumulative impact analysis included existing Enbridge pipelines, the Keystone oil pipeline, the MinnCan oil pipeline, and oil refining (including the potential expansion of the Murphy Oil Refinery).

Additional small-scale project types were considered as part of this watershed-based analysis, including current and reasonably foreseeable actions such as state and county highway development, residential/commercial development, flood control projects, mining, and government conservation programs. County and state agencies within affected watersheds were contacted to determine potential state and county highway development, potential residential and commercial development projects, and potential flood control projects.

Specific projects or activities unique to one or two individual watersheds also were considered, including the proposed U.S. Highway 2 expansion, the CapX2020 transmission project, timber harvesting, mining (including peat), and potential projects at the Enbridge Superior Terminal (including the Superior Terminal Expansion Project and potential merchant tanks). The projects with specific and available mapping locations are depicted in Figure 4.14.2-1.

The impacts of current and reasonably foreseeable projects are discussed within each watershed along the proposed Alberta Clipper route from the Pembina and Lower Red River Watersheds in North Dakota; through the Lower Red River, Snake River, Red Lake River, Clearwater River, Mississippi River Headwaters, No Name Given / Leech Lake River, Prairie-Willow, St. Louis River, and Kettle River Watersheds in Minnesota; to the Beartrap-Nemadji River Watershed in Wisconsin.

4.14.5 Pembina River Watershed (North Dakota)

4.14.5.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Pembina River Watershed encompasses 1,861 square miles in northeast North Dakota. The watershed spans portions of Pembina, Walsh, Cavalier, Towner, and Rolette Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Pembina River Watershed for approximately 15.4 miles in Pembina County within the Red River Prairie ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

Red River Prairie ECS Subsection in North Dakota

The entire proposed Alberta Clipper route through the Pembina River Watershed lies within the Red River Prairie ECS subsection. The proposed Alberta Clipper route through this ECS subsection in North Dakota crosses only Pembina County.

Historically, most of the Pembina River Watershed within the Red River Prairie ECS subsection was comprised of prairie and wetlands (Table 4.14.5-1).

TABLE 4.14.5-1 Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Pembina River Watershed – Pembina County, North Dakota					
	Pre-Settlement Conditions		**Baseline Conditions**		
Ecological Classification System (ECS)Subsection/ Land Use	**Pre-Settlement Acreage (thousands)**	**Relative Percentage for ECS (%)**	**GAP Land Use or NWI Acreage[c] (thousands)**	**Relative Percentage for Watershed (%)**	**Percentage Change Pre-Settlement to Baseline (%)**
Red River Prairie					
Forest	12.51	3.80	23.60	7.17	+3.37
Shrubland	0.00	0.00	0.66	0.20	0.20
Prairie/grassland	155.68	47.28	19.08	5.79	-41.49
Wetland	128.46	39.02	5.44	1.65	-37.37
Forested wetland	32.59	9.90	1.99	0.60	-9.29
Agricultural	0.00	0.00	275.60	83.68	83.68
Developed	0.00	0.00	2.96	0.90	0.90
Total	**329.24**	**100.00**	**329.33**	**100.00**	
GAP emergent wetland			*9.23*[d]		
GAP forested wetland			*13.62*[e]		

[a] Pre-settlement land cover distribution was determined by estimating the potential native vegetation associated with individual soil series and then determining the distribution using SSURGO2 (Soil Survey Geographic database, Version 2, U.S. Department of Agriculture NRCS) GIS.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with scrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s may incorporate some additional Conservation Reserve Program wetlands.

[e] GAP forested wetlands is elevated because all riparian forests (floodplain forests) were considered wetlands in the analysis.

Demographics

Pembina County is sparsely populated, with a population of approximately 7,500 people. The Pembina County population experienced a decrease (12.3 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Cavalier is the county seat of Pembina County and the largest town in the county with approximately 1,500 residents (U.S. Census Bureau 2000).

4.14.5.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project crosses the Pembina River Watershed from approximately MP 774.7 to MP 790.1, for a total of 15.4 miles. Most of the proposed Alberta Clipper route in the Pembina River Watershed would cross existing agricultural land. Table 4.14.5-2 compares the existing land use estimates for the Pembina River Watershed in the Red River Prairie ECS subsection with the effects of the proposed Alberta Clipper Project.

The baseline land use was 83.7 percent agricultural land. Land use changes caused by the Project would be small because most agricultural land would return to pre-construction uses following construction. In the Pembina County portion of the Pembina River Watershed, shrubland would increase less than 1 percent.

TABLE 4.14.5-2 Cumulative Effect of Combined Enbridge Projects in the Pembina River Watershed – Pembina County, North Dakota									
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b] (acres)**	**Land Use in Added Enbridge ROW[c] (acres)**	**Add'n. LSr Perm. ROW[d] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (%)**
Red River Prairie									
Forest	23,600	2.15	1.44	1.47	0.87	5.93	0.00	-5.93 (+5.93)	-0.03 (+0.03)
Shrubland	660	0.00	0.00	0.00	0.00	0.00	1.67	+2.97	+0.45
Prairie	29,790	2.12	1.48	0.98	0.66	5.24	3.69	+2.97	<+0.01
Wetland	11,589	0.69	0.46	0.90	0.41	2.46	2.46	+0.28	0.00
Forested wetland	1,990	0.05	0.03	0.13	0.07	0.28	0.28	0.00	0.00
Agriculture	258,741	135.50	90.30	89.82	44.67	360.30	360.30	0.00	0.00
Developed	2,960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**329,330**	**140.50**	**93.70**	**93.30**	**46.70**	**374.20**	**374.30**	**0.00**	**NA**

a Red River Prairie Ecological Classification System (ECS) data from Table 4.14.5-1 were adjusted to include an estimated 15,141 acres of Conservation Reserve Program (CRP) lands (FSA 2009, NRCS 2009a) that were converted from cropland to wetland (29.3 percent, 4,431 acres) and prairie/grassland (71 percent, 10,710 acres). An additional 1,718 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage. CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the CRP acreage in Pembina County by the percentage of the county in the Pembina River Watershed. This reduced acreage then was multiplied by 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.5-1, see also Table 4.14.5-3), with the remainder placed in the prairie/grassland category.

b The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

c From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

d The LSr and Alberta Clipper Projects would require additional permanent easements (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

e Total existing land use acreage in the total 200-foot-wide permanent easement.

f Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland. Approximately 2.16 acres of forested wetland would be avoided by using horizontal directional drilling methods.

g Changes in acres of land on the existing right-of-way from pre-construction to post-restoration conditions. Values in parentheses for forest and forested wetland indicate the actual increase in forested resources resulting from the mitigation of trees at a 2:1 ratio, offsetting the reduction in forest resources along the right-of-way and increasing the total resource by the amount taken.

h Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

State and County Highway Development

The Pembina County Highway Department currently reports no proposed road construction or road widening projects.

Residential and Commercial Development Projects

The population of Pembina County decreased 12.3 percent from 2000 to 2007 (U.S. Census Bureau 2009). There are currently no known potential developments for the Pembina River region in the vicinity of the proposed Alberta Clipper Project.

Flood Control Projects

The most significant potential flood control project is a levee project proposed in 1986 by the COE for the town of Neche, North Dakota. The project has not been built due to lack of funding. Because the predominant land use in Pembina County is agriculture, flood control is an issue of concern. The NRCS flood control program has assisted landowners in designing flood control structures and in obtaining riparian easements for flood control. Riparian easements are planted with native vegetation and are managed for recreational and wildlife use. Existing flood control programs likely would continue to result in acquisition of riparian easements, which would benefit riparian zones and adjacent wetlands.

Government Conservation Programs

At the time of baseline conditions (1980s), most conservation reserve programs had not yet been established. Conserved areas are restored to natural environments and planted with native vegetation, which provides a substantial positive impact on the resources of the area. As shown in Table 4.14.5-3, 15,141 acres within the Pembina County portion of the Pembina River Watershed have been enrolled in the CRP or the CREP program. An additional 1,718 acres of farmed wetlands in these areas have been restored under the WRP.

TABLE 4.14.5-3
Land in Conservation Programs in Pembina River Watershed Counties in North Dakota Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Red River Prairie						
Pembina	719,300	330,040	32,998	3,744	15,141	1,718
Total					**15,141**	**1,718**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] Conservation lands data obtained from FSA (2009) and NRCS (2009a).

[b] County acres within the Pembina River Watershed were determined by GIS query.

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: FSA 2009.

[d] The Wetlands Reserve Program restores historically farmed or drained wetlands. Source: NRCS 2009a.

[e] Watershed acres were estimated by dividing the acres in the watershed by total county acres and then multiplying by the total county acres in conservation easements.

Other Projects

Keystone Pipeline Project

The Keystone Pipeline Project traverses the extreme western edge of Pembina County from north to south. Project disturbance is in the Pembina River Watershed on the western edge of the Red River Prairie ECS subsection. Both projects would use the HDD crossing method, which would be conducted to avoid direct impacts to the Pembina River. Enbridge proposes to cross the Tongue River using HDD construction methods, thereby avoiding impacts. Use of COE-approved open-cut construction methods by Keystone for crossing the Tongue River and post-construction stabilization and restoration are expected to result in short-term minor impacts to the Tongue River.

4.14.5.3 Cumulative Impacts

Prior to settlement, the Pembina County portion of the Pembina River Watershed was 96 percent prairie, wetlands, and forested wetlands. The baseline land use was 83.7 percent agricultural land. The process of settlement has been characterized by conversion of native prairies and wetlands to agricultural lands. Of the lands crossed by the Alberta Clipper Project, 96.3 percent would be agricultural lands (360.3 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 5.9 acres would be forested, 5.2 acres would be prairie/grassland, and 2.5 acres would be wetlands. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the Pembina River Watershed (including the portions in North Dakota and Minnesota).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the Pembina River Watershed in North Dakota.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Pembina River Watershed in North Dakota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.5.4 Cumulative Impacts on Identified Sensitive Resources

The following sensitive resources have been identified in the Pembina River Watershed: the Pembina River (MP 775.5) and the Tongue River (MP 786.1). The Keystone pipeline also would cross both the Pembina River and Tongue River.

River Crossings

The Alberta Clipper Project would cross the Pembina River and the Tongue River using the HDD construction method. Using the HDD method would allow Enbridge to avoid impacting the Pembina River and the Tongue River.

Keystone recently used HDD methods to cross the Pembina River. The Keystone project recently used open-cut methods to cross the Tongue River but at a location several miles upstream of the Alberta Clipper Project crossing. Although the open-cut crossing may have resulted in temporary or short-term turbidity and sedimentation in the Tongue River during construction, recent and ongoing post-construction stabilization and restoration of the river banks are expected to mitigate long-term impacts.

4.14.6 Lower Red River Watershed (North Dakota)

4.14.6.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Lower Red River Watershed (North Dakota portion) encompasses 309 square miles in northeast North Dakota. The watershed spans portions of Pembina and Walsh Counties (Figure 4.14.4-1). The

proposed Alberta Clipper route crosses the Lower Red River Watershed for approximately 12.6 miles in Pembina County within the Red River Prairie ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

Red River Prairie ECS Subsection in North Dakota

The entire proposed Alberta Clipper route through the Lower Red River Watershed in North Dakota is located in the Red River Prairie ECS subsection. The proposed Alberta Clipper route through this ECS subsection in North Dakota crosses only Pembina County.

Historically, most of the Lower Red River Watershed within the Red River Prairie ECS subsection in North Dakota was comprised of prairie and wetlands (Table 4.14.6-1).

TABLE 4.14.6-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Lower Red River Watershed – Pembina County, North Dakota

Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS(%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Red River Prairie					
Forest	0.66	0.35	2.19	1.16	+0.81
Shrubland	0.00	0.00	<0.01	0.00	0.00
Prairie/grassland	81.52	43.13	6.49	3.43	-39.70
Wetland	98.63	52.19	5.05	2.67	-49.52
Forested wetland	8.18	4.33	0.80	0.42	-3.91
Agricultural	0.00	0.00	172.98	91.49	+91.49
Developed	0.00	0.00	1.57	0.83	+0.83
Total	**188.99**	**100.00**	**189.08**	**100.00**	
GAP emergent wetland			*7.22*[d]		
GAP forested wetland			*2.12*[e]		

a Pre-settlement land cover distribution was determined by estimating the potential native vegetation associated with individual soil series and then determining the distribution using SSURGO2 (Soil Survey Geographic database, Version 2, NRCS 2008) GIS.

b Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

c GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with scrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

d GAP photography late 1980s may incorporate some additional Conservation Reserve Program wetlands.

e GAP forested wetlands is elevated as all riparian forests (floodplain forests) were considered wetlands in the analysis.

Demographics

Pembina County is sparsely populated, with a population of approximately 7,500 people. The Pembina County population decreased (12.3 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Cavalier is the county seat of Pembina County and the largest town in the county, with approximately 1,500 residents (U.S. Census Bureau 2000).

4.14.6.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project crosses the Lower Red River Watershed in North Dakota from approximately MP 773.8 to MP 774.7 and from MP 790.1 to MP 801.8, for a total of 12.6 miles. Most of the proposed Alberta Clipper route within the Lower Red River Watershed in North Dakota would cross existing agricultural land. Table 4.14.6-2 compares the existing land use estimates for the Lower Red River Watershed within the Red River Prairie ECS subsection with the effects of the proposed Alberta Clipper Project.

TABLE 4.14.6-2
Cumulative Effect of Combined Enbridge Projects in the Lower Red River Watershed – Pembina County, North Dakota

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b] (acres)	Land Use in Added ROW[c] (acres)	Add'n. LSr Perm. ROW[d] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Red River Prairie									
Forest	2,190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shrubland	<10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Prairie grassland	11,780	6.07	4.04	1.24	0.33	11.68	11.68	0.00	0.00
Wetland	9,438	9.44	6.29	11.53	5.66	32.89	32.89	0.00	0.00
Forested wetland	800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	163,302	98.07	65.38	62.18	31.50	257.10	257.10	0.00	0.00
Developed	1,570	0.60	0.40	1.10	0.54	2.64	2.64	0.00	0.00
Total	**189,080**	**114.20**	**76.10**	**76.10**	**38.00**	**304.30**	**304.30**	**0.00**	**NA**

[a] Red River Prairie Ecological Classification System (ECS) data from Table 4.14.6-1 were adjusted to include an estimated 8,692 acres of Conservation Reserve Program (CRP) lands (Table 4.14.6-3) that were converted from cropland to wetland (39 percent, 3,402 acres) and prairie (61 percent, 5,290 acres). An additional 986 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage. CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP land in Pembina County by the percentage of the county in the Lower Red River Watershed. This reduced acreage then was multiplied by 75 percent of the decimal fraction of wetlands under pre-settlement conditions (see Table 4.14.6-1, see also Table 4.14.6-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easements (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easement.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural, prairie, and emergent wetland land would revert to pre-construction uses. No forested upland, wetland, or shrubland would be impacted.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions. No changes in land use or wetland status are expected.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

The baseline land use was 91.5 percent agricultural land. No land use changes are proposed.

State and County Highway Development

The Pembina County Highway Department reports no proposed road construction or road widening projects.

Residential and Commercial Development Projects

The population of Pembina County decreased 12.3 percent from 2000 to 2007 (U.S. Census Bureau 2009). There are no known potential developments for the Pembina River Region in the vicinity of the proposed Alberta Clipper Project.

Flood Control Projects

No major flood control projects are proposed for the Lower Red River Watershed in Pembina County. Because the predominant land use in Pembina County is agriculture, flood control is an issue of concern. The NRCS flood control program has assisted landowners in designing flood control structures and in obtaining riparian easements for flood control. Riparian easements are planted with native vegetation and are managed for recreational and wildlife use. Existing flood control programs likely would continue to result in acquisition of riparian easements, which would benefit riparian zones and adjacent wetlands.

Government Conservation Programs

At the time of baseline conditions (1980s), most conservation reserve programs had not yet been established. Conserved areas are restored to natural environments and planted with native vegetation, which results in a substantial positive impact on the resources of the area. As shown in Table 4.14.6-3, 8,692 acres within the Pembina County portion of the Lower Red River Watershed have been enrolled in the CRP, the CREP, or the RIM program. An additional 986 acres of farmed wetlands in these areas have been restored under the WRP.

TABLE 4.14.6-3
Land in Conservation Programs in the Lower Red River Watershed Counties in North Dakota Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Red River Prairie						
Pembina	719,300	189,470	32,998	3,744	8,692	986
Total					**8,692**	**986**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] Conservation lands data obtained from FSA (2009) and NRCS (2009a).
[b] County acres within the Lower Red River Watershed were determined by GIS query.
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.
[d] The Wetlands Reserve Program restores historically farmed or drained wetlands.
[e] Watershed acres were estimated by dividing the acres in the watershed by total county acres and then multiplying by the total county acres in conservation easements.

Other Projects

Keystone Pipeline Project

The Keystone Pipeline Project traverses the extreme western edge of Pembina County from north to south. The Keystone Pipeline Project did not create disturbance in the Lower Red River Watershed.

4.14.6.3 Cumulative Impacts

Prior to settlement, the Pembina County portion of the Lower Red River Watershed was over 99 percent prairie, wetlands, and forested wetlands. The baseline land use was 91.5 percent agricultural land. The process of settlement has been characterized by conversion of native prairies and wetlands to agricultural lands. Of the lands crossed by the Alberta Clipper Project, 84 percent would be agricultural lands (257.1 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 32.9 acres would be wetlands, 11.7 acres would be grassland, and 2.6 acres would be developed. The proposed Alberta Clipper Project would impact approximately 0.2 percent of the total acreage of the Lower Red River Watershed (including the portions in North Dakota and Minnesota).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Lower Red River Watershed in North Dakota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.6.4 Cumulative Impacts on Identified Sensitive Resources

The following sensitive resources have been identified in the Lower Red River Watershed in North Dakota: the Red River of the North crossing (MP 801.7) and a relatively large area of CRP land (MP 790.6 to MP 793.0).

River Crossings

The Alberta Clipper Project would cross the Red River of the North using the HDD construction method. This method would avoid impacts to the Red River of the North.

CRP Land

Enbridge consulted with NRCS to develop plans for reclaiming disturbed land between MP 790.6 and MP 793.0. Enbridge would implement the following mitigation measures in this area of CRP land: (1) use NRCS recommended seeding mixtures to replant the disturbed land; and (2) mitigate tree and shrub disturbance at a 2:1 ratio.

4.14.7 Lower Red River Watershed (Minnesota)

4.14.7.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Lower Red River Watershed (Minnesota portion) encompasses 894 square miles in northwest Minnesota. The watershed spans portions of Kittson, Marshall, and Roseau Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Lower Red River Watershed for approximately 32.4 miles in Kittson and Marshall Counties, within the Red River Prairie ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

Red River Prairie ECS Subsection in Minnesota

The entire proposed Alberta Clipper route through the Lower Red River Watershed in Minnesota lies within the Red River Prairie ECS subsection. The proposed Alberta Clipper route crosses Kittson and Marshall Counties in Minnesota within this ECS subsection.

Historically, most of the Lower Red River Watershed within the Red River Prairie ECS subsection in Minnesota was comprised of prairie, wetlands, and riparian forest (Table 4.14.7-1).

TABLE 4.14.7-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Lower Red River Watershed – Marshall and Kittson Counties, Minnesota

Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Red River Prairie					
Forest	0.00	0.00	2.18	0.60	0.60
Shrubland	0.89	0.25	0.38	0.10	-0.15
Prairie/grassland	225.09	63.60	4.97	1.38	-62.22
Wetland	87.47	24.72	2.51	0.69	-24.03
Forested wetland	40.44	11.43	0.93	0.26	-11.17
Agricultural	0.00	0.00	349.57	96.76	96.76
Developed	0.00	0.00	0.74	0.20	0.20
Total	**353.89**	**100.00**	**361.28**	**100.00**	
GAP emergent wetland			*1.61*[d]		
GAP forested wetland			*0.60*[d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with scrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] GAP estimates are conservative and are less than NWI wetland estimates.

Demographics

Kittson County is sparsely populated, with a population of approximately 4,500. The Kittson County population experienced a decrease (14.8 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Hallock is the county seat of Kittson County and the largest town in the county, with approximately 1,200 residents (U.S. Census Bureau 2000).

Marshall County is sparsely populated, with a population of approximately 9,600. The Marshall County population experienced a decrease (5.3 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Warren is the county seat of Marshall County and the largest town in the county, with approximately 1,700 residents (U.S. Census Bureau 2000).

4.14.7.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the Lower Red River Watershed (Minnesota portion) from approximately MP 801.8 to MP 834.0, for a total of approximately 32.4 miles. Most of the proposed Alberta Clipper route within the Lower Red River Watershed would cross existing agricultural land. Table 4.14.7-2 compares the existing land use estimates for the Lower Red River Watershed within the Red River Prairie ECS subsection with the effects of the proposed Alberta Clipper Project.

The baseline land use was 97 percent agricultural land. Land use changes caused by the Project would be negligible (0.7 percent or less).

State and County Highway Development

MDOT reports no proposed road construction or road widening projects in Kittson or Marshall Counties.

Residential and Commercial Development Projects

The population of Kittson County decreased 14.8 percent from 2000 to 2007, and the population of Marshall County decreased 5.3 percent from 2000 to 2007 (U.S. Census Bureau 2009). There are no known potential developments for the Lower Red River Region in the vicinity of the proposed Alberta Clipper Project.

Flood Control Projects

No major flood control projects are planned for the Lower Red River Watershed in Kittson or Marshall Counties. Therefore, flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of riparian easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

At the time of baseline conditions (1980s), most conservation reserve programs had not yet been established. Conserved areas are restored to natural environments and planted with native vegetation, which results in a substantial positive impact on the resources of the area. As shown in Table 4.14.7-3, 57,071 acres within the Kittson and Marshall Counties portion of the Lower Red River Watershed have been enrolled in the CRP, the CREP, or the RIM Program. An additional 746 acres of farmed wetlands in these areas have been restored under the WRP.

Minnesota regulates wetlands under authority of the WCA. No wetland conversions occurred in Kittson or Marshall Counties from 1999 through 2003.

TABLE 4.14.7-2
Cumulative Effect of Combined Enbridge Projects in the Lower Red River Watershed – Marshall and Kittson Counties, Minnesota

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. LSr Perm. ROW[d] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Red River Prairie									
Forest	2,180	0.00	0.00	0.05	0.06	0.11	0.00	-0.11	-0.01
Shrubland	380	0.00	0.00	0.00	0.00	0.00	0.05	+0.05	0.01
Prairie / grassland	51,461	4.26	2.84	2.89	1.47	11.46	11.52	+0.06	<0.01
Wetland	13,836	2.42	1.61	2.54	1.18	7.75	9.56	1.81	0.07
Forested wetland	930	0.69	0.46	0.47	0.19	1.81	1.81	0.00	0.00
Agriculture	291,753	287.70	191.80	190.77	95.46	765.76	765.76	0.00	0.00
Developed	740	0.14	0.10	0.00	0.00	0.24	0.24	0.00	0.00
Total	**361,280**	**295.20**	**196.80**	**196.70**	**98.36**	**787.10**	**788.94**	**1.81**	**NA**

[a] Red River Prairie Ecological Classification System (ECS) data from Table 4.14.7-1 were adjusted to include an estimated 57,071 acres of Conservation Reserve Program (CRP) lands (Table 4.14.7-3) that were converted from cropland to wetland (19 percent, 10,580 acres) and prairie/grassland (81 percent, 46,491 acres). An additional 746 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage. CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Kittson and Marshall Counties by the percentage of each county in the Red River Prairie ECS subsection within the Lower Red River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.7-1, see also Table 4.14.7-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easements (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland. Approximately 1.81 acres of forested wetland would be avoided by using horizontal direction drilling methods.

[g] Changes in acres of land in the existing right-of-way from pre construction to post restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

TABLE 4.14.7-3 Land in Conservation Programs in the Lower Red River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]						
County	**Total County Acres**	**Watershed Acres in County[b]**	**CRP/CREP/RIM Acres in County[c]**	**WRP Acres in County[d]**	**CRP/CREP/RIM Acres in Watershed[e]**	**WRP Acres in Watershed[e]**
Red River Prairie						
Kittson	706,727	230,230	107,869	177	35,140	58
Marshall	1,161,204	131,090	194,265[f]	6,097	21,931	688
Total					**57,071**	**746**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

a A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

b County acres within the Lower Red River Watershed were determined by GIS query.

c Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.

d The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands.

e Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

f For Marshall County, 118 acres of the CRP/CREP/RIM lands are jointly enrolled in the RIM and WRP.

Other Projects

Great Lakes Gas Pipeline Project

The existing Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Lower Red River Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.7.3 Cumulative Impacts

Prior to settlement, the Kittson and Marshall Counties' portion of the Lower Red River Watershed were over 99 percent prairie, wetlands, and forested wetlands. The baseline land use was 97 percent agricultural land. The process of settlement has been characterized by conversion of native prairies and wetlands to agricultural lands. Of the lands crossed by the Alberta Clipper Project, 97 percent would be agricultural lands (765.8 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 11.5 acres would be grassland, 9.6 acres would be wetlands, 0.2 acre would be developed, and 0.1 acre would be forested. The proposed Alberta Clipper Project would impact approximately 0.2 percent of the total acreage of the Lower Red River Watershed (including the portions in North Dakota and Minnesota).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed

inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Lower Red River Watershed in Minnesota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.7.4 Cumulative Impacts on Identified Sensitive Resources

The following sensitive resources have been identified in the Lower Red River Watershed: the Red River of the North (MP 801.7), discussed in Section 4.14.6, and the Tamarac River (MP 828.7).

River Crossings

The Alberta Clipper Project would cross the Tamarac River using the HDD construction method. Using this method would avoid impacts to the Tamarac River.

4.14.8 Snake River Watershed (Minnesota)

4.14.8.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Snake River Watershed encompasses 917 square miles in northwest Minnesota. The watershed spans portions of Pennington, Marshall, and Polk Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Snake River Watershed for approximately 18.0 miles in Marshall County within the Aspen Parklands ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

Aspen Parklands ECS Subsection in Minnesota

The entire proposed Alberta Clipper route through the Snake River Watershed is within the Aspen Parklands ECS. The proposed route through this ECS subsection crosses only Marshall County.

Historically, most of the Snake River Watershed in the Aspen Parklands ECS subsection was comprised of prairie, wetlands, and shrubland (Table 4.14.8-1).

Demographics

Marshall County is sparsely populated, with a population of approximately 9,600. The Marshall County population slightly decreased (5.3 percent) between 2000 and 2007 (U.S. Census Bureau 2009). Warren is the county seat of Marshall County and the largest town in the county, with approximately 1,700 residents (U.S. Census Bureau 2000).

TABLE 4.14.8-1 Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Snake River Watershed – Marshall County, Minnesota					
	Pre-Settlement Conditions		Baseline Conditions		
Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Aspen Parklands					
Forest	8.62	2.59	28.58	8.59	6.00
Shrubland	87.94	26.42	5.12	1.54	-24.88
Prairie/grassland	185.86	55.84	17.68	5.31	-50.53
Wetland	27.44	8.24	18.70	5.62	-2.62
Forested wetland	23.00	6.91	11.66	3.53	-3.38
Agricultural	0.00	0.00	250.73	75.33	75.33
Developed	0.00	0.00	0.35	0.11	0.35
Total	**332.85**	**100.00**	**332.82**	**100.00**	
GAP emergent wetland			*12.43*[d]		
GAP forested wetland			*12.51*[e]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with scrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s underestimates wetlands when compared to NWI estimates.

[e] GAP photography late 1980s overestimates forested wetlands when compared to NWI estimates. GAP forested wetlands may be elevated as all riparian forests (floodplain forests) were considered wetlands in the analysis.

4.14.8.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project crosses the Snake River Watershed from approximately MP 833.9 to MP 851.6, for a total of 18.0 miles. Most of the proposed Alberta Clipper route within the Snake River Watershed would cross existing agricultural land. Table 4.14.8-2 compares the existing land use estimates for the Snake River Watershed in the Aspen Parklands ECS subsection with the effects of the proposed Alberta Clipper Project.

The baseline land use was 75 percent agricultural land, 9 percent forest, 5 percent prairie, and 9 percent wetlands. In the Snake River Watershed, shrubland and prairie each would increase less than 1 percent, and forestland would decrease less than 1 percent.

State and County Highway Development

MDOT reports no proposed road construction or road widening projects in Marshall County.

TABLE 4.14.8-2 Cumulative Effect of Combined Enbridge Projects in the Snake River Watershed – Marshall County, Minnesota									
Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. LSr Perm. ROW[d] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Aspen Parklands									
Forest	28,580	4.02	2.68	2.62	1.80	11.12	-11.12	-11.12	-0.04
Shrubland	5,120	0.69	0.46	0.54	0.33	2.02	7.58	+5.56	+0.11
Prairie / grassland	62,145	5.51	3.68	2.03	0.78	12.00	17.56	+5.56	+0.01
Wetland	23,118	6.32	4.21	10.07	4.49	25.09	25.47	+0.38	<0.01
Forested wetland	11,660	<0.01	<0.01	0.27	0.10	0.38	-0.38	-0.38	<-0.01
Agriculture	201,847	145.88	97.19	92.71	46.50	382.28	382.28	0.00	0.00
Developed	350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**332,820**	**162.42**	**108.22**	**108.24**	**54.00**	**432.88**	**433.01**	**0.00**	**NA**

[a] Aspen Parklands Ecological Classification System (ECS) data from Table 4.14.8-1 were adjusted to include an estimated 47,395 acres of Conservation Reserve Program (CRP) lands (Table 4.14.8-3) that were converted from cropland to wetland (6 percent, 2,930 acres) and prairie/grassland (94 percent; 44,465 acres). An additional 1,488 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage. CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Marshall County by the percentage of the county in the Aspen Parklands ECS subsection in the Snake River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.8-1, see also Table 4.14.8-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easements (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

Residential and Commercial Development Projects

There are no known potential developments within the Snake River Watershed in the vicinity of the proposed Alberta Clipper Project.

Flood Control Projects

Flood control projects are planned for the Snake River Watershed in Marshall and Polk Counties. Two projects planned for the Snake River include impoundments and flood channels; however, both projects would include wetland mitigation. Therefore, flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to

result in the acquisition of riparian easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

At the time of baseline conditions (1980s), most conservation reserve programs had not yet been established. Conserved areas are restored to natural environments and planted with native vegetation, which results in a substantial positive impact on the resources of the area. As shown in Table 4.14.8-3, 47,395 acres within the Marshall County portion of the Snake River Watershed have been enrolled in the CRP, the CREP, or the RIM program. An additional 1,488 acres of farmed wetlands in this area have been restored under the WRP.

From 1999 through 2003, no wetland conversions occurred in Marshall County under the WCA.

TABLE 4.14.8-3
Land in Conservation Programs in Snake River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Aspen Parklands						
Marshall	1,161,204	283,300	194,265[f]	6,097	47,395	1,488
Total					**47,395**	**1,488**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.
[b] County acres within the Snake River Watershed were determined by GIS query.
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.
[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands.
[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.
[f] For Marshall County, 118 acres of the CRP/CREP/RIM lands are jointly enrolled in the RIM and WRP.

Other Projects

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Snake River Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.8.3 Cumulative Impacts

Prior to settlement, the Marshall County portion of the Snake River Watershed was 97 percent prairie, wetlands, and shrubland. The baseline land use was 75 percent agricultural land. The process of settlement has been characterized by conversion of native prairies, shrublands, and wetlands to agricultural lands. Of the lands crossed by the Alberta Clipper Project, 88 percent would agricultural lands (382.3 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 25 acres would be wetlands, 12 acres would be grassland, 11 acres would be forested, and 2 acres would be shrubland. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the Snake River Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, or commercial or residential developments are currently or reasonably foreseeable within the watershed. No adverse impacts are expected from the planned flood control projects because wetlands would be mitigated.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Snake River Watershed in Minnesota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.8.4 Cumulative Impacts on Identified Sensitive Resources

The following sensitive resources have been identified in the Snake River Watershed: the Middle River (MP 835.9), the Snake River (MP 843.2), forested areas, and the Viking Calcareous Fen Complex.

River Crossings

The Alberta Clipper Project would cross the Middle River and Snake River using the HDD construction method. Using the HDD method would avoid impacts to both rivers. Approximately 0.4 acre of forested wetland would be cleared during construction.

Forested Areas

The proposed Project route crosses six aspen groves in the Snake River Watershed. Each of these groves has been crossed previously by pipeline projects and is surrounded by agricultural land. The proposed Project would result in an increase in the cleared pathway through the groves from the current width of 125 feet to 200 feet. The cleared area would be converted to shrubland. The conversion is expected to result in a minor but long-term impact.

Viking Calcareous Fen Complex

The Viking Calcareous Fen Complex is listed as an Outstanding Resource Value Water and is regulated by the MPCA. The Project route was adjusted to avoid crossing the Viking Calcareous Fen Complex; consequently, the proposed Project would not impact the fen.

4.14.9 Red Lake River Watershed (Minnesota)

4.14.9.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Red Lake River Watershed encompasses 1,387 square miles in northwest Minnesota. The watershed spans portions of Marshall, Pennington, Red Lake, Beltrami, Clearwater, and Polk Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Red Lake River Watershed for approximately 22.4 miles in Marshall, Pennington, and Red Lake Counties within the Aspen Parklands ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

Aspen Parklands ECS Subsection in Minnesota

The entire proposed Alberta Clipper route through the Red Lake River Watershed lies within the Aspen Parklands ECS subsection. The proposed Alberta Clipper route through this ECS subsection crosses Marshall, Pennington, and Red Lake Counties.

Historically, most of the Red Lake River Watershed within the Aspen Parklands ECS subsection was comprised of prairie, wetlands, and shrubland (Table 4.14.9-1).

TABLE 4.14.9-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Red Lake River Watershed – Marshall, Pennington, and Red Lake Counties, Minnesota

Ecological Classification System (ECS) Subsection / Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Aspen Parklands					
Forest	41.91	7.48	25.91	4.63	-2.85
Shrubland	125.67	22.44	3.06	0.55	-21.89
Prairie/grassland	284.73	50.84	37.47	6.69	-44.15
Wetland	98.85	17.65	37.08	6.62	-11.03
Forested wetland	8.93	1.59	16.20	2.89	+1.30
Agricultural	0.00	0.00	436.27	77.89	+77.89
Developed	0.00	0.00	4.07	0.73	+0.73
Total	**560.09**	**100.00**	**560.06**	**100.00**	
GAP emergent wetland			*29.04*[d]		
GAP forested wetland			*10.69*[e]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with scrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate lower acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] GAP photography late 1980s underestimates both emergent and forested wetlands when compared to NWI estimates.

Demographics

Marshall County is sparsely populated, with a population of approximately 9,600. The Marshall County population decreased 5.3 percent from 2000 to 2007 (U.S. Census Bureau 2009). Warren is the county seat of Marshall County and the largest town in the county, with approximately 1,700 residents (U.S. Census Bureau 2000).

Pennington County is rural, with a population of approximately 13,800. Pennington County's population is stable (U.S. Census Bureau 2000). Thief River Falls is the county seat and largest town in the county with 8,400 residents (U.S. Census Bureau 2000).

Red Lake County is sparsely populated, with a population of approximately 4,100. Red Lake County's population experienced a decrease (4.2 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Red Lake Falls is the county seat and largest town, with approximately 1,600 residents (U.S. Census Bureau 2000).

4.14.9.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project crosses the Red Lake River Watershed from approximately MP 851.6 to MP 873.9, for a total of 22.4 miles. Most of the proposed Alberta Clipper route within the Red Lake River Watershed would cross existing agricultural land. Table 4.14.9-2 compares the existing land use estimates for the Red Lake River Watershed within the Aspen Parklands ECS subsection with the effects of the proposed Alberta Clipper Project.

The baseline land use was 78 percent agricultural land, 5 percent forest, 7 percent prairie, and 10 percent wetlands. In the Red Lake River Watershed, shrubland and prairie each would increase less than 1 percent, and forestland would decrease about 0.1 percent.

State and County Highway Development

The only highway development project identified in the watershed is in Polk County, which would not be crossed by the proposed Project. Specifically, MDOT reports a proposed road resurfacing project for Route 102 between the towns of Fertile and Crookston, Minnesota. This project is slated for construction in the 2009 fiscal year (MDOT 2008). This project would be approximately 30 miles west of the proposed Alberta Clipper Project. The project does not involve widening the road. The project is expected to cause minimal impacts in the Red Lake River Watershed. No highway projects are proposed in Marshall, Pennington, Red Lake, Beltrami, or Clearwater Counties.

Residential and Commercial Development Projects

The population of Marshall County decreased 5.3 percent between 2000 and 2007. The population of Pennington County increased by 172 people (1.3 percent) from 2000 to 2007. The population in Red Lake County decreased by 181 people (4.2 percent) from 2000 to 2007. The most likely location for future growth is the area around Thief River Falls in Pennington County, which is the largest town in Pennington, Marshall, and Red Lake Counties. A subdivision has been laid out near MP 864.5 on the Red Lake River, but development has not yet begun. Significant additional building would depend on a growing population.

TABLE 4.14.9-2 Cumulative Effect of Combined Enbridge Projects in the Red Lake River Watershed – Marshall, Pennington, and Red Lake Counties, Minnesota									
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. LSr Perm. ROW[d] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (%)**
Aspen Parklands									
Forest	25,910	12.04	7.43	8.69	3.40	31.56	-31.56	-31.56	-0.12
Shrubland	3,060	0.47	0.18	0.24	0.15	1.04	16.82	+15.78	+0.52
Prairie / grassland	105,260	9.48	6.32	5.61	2.59	24.00	56.60	+15.78	+0.01
Wetland	47,500	15.26	10.17	13.34	5.57	44.34	48.21	+3.87	0.01
Forested wetland	16,200	0.00	0.00	1.72	2.15	3.87	-3.87	-3.87	-0.02
Agriculture	358,060	166.43	110.93	105.66	53.79	436.81	436.81	0.00	0.00
Developed	4,070	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**560,060**	**203.68**	**135.03**	**135.26**	**67.65**	**541.62**	**541.62**	**0.00**	**NA**

[a] Aspen Parklands Ecological Classification System (ECS) subsection data from Table 4.14.9-1 were adjusted to include an estimated 78,132 acres of Conservation Reserve Program (CRP) lands (Table 4.14.9-3) that were converted from cropland to wetland (13 percent, 10,342 acres) and prairie/grassland (87 percent; 67,790 acres). An additional 78 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage. CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Pennington, Red Lake, and Polk Counties by the percentage of the county in the Aspen Parklands ECS subsection in the Red Lake River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.9-1, see also Table 4.14.9-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easements (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

Flood Control Projects

No major flood control projects are planned for the Red Lake River Watershed in Marshall, Pennington, or Red Lake Counties. Therefore, flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of riparian easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

At the time of baseline conditions (1980s), most conservation reserve programs had not yet been established. Conserved areas would be restored to natural environments and planted with native vegetation. This would result in a substantial positive impact on the resources of the area. As shown in

Table 4.14.9-3, 78,132 acres within the Marshall, Pennington, and Red Lake Counties portion of the Red Lake River Watershed have been enrolled in the CRP, the CREP, or the RIM program. Approximately 78 acres of formerly farmed wetlands were taken out of production and converted back to wetlands under the WRP in the Red Lake River Watershed.

TABLE 4.14.9-3
Land in Conservation Easements in the Red Lake River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2007)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Aspen Parklands						
Pennington	395,841	327,900	72,119	0	59,741	0
Red Lake	276,802	97,540	45,255	5	15,947	2
Marshall	1,161,204	14,610	194,265[f]	6,097	2,444	77
Total					**78,132**	**78**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.
[b] County acres within the Red Lake River Watershed were determined by GIS query. Beltrami and Clearwater Counties are not included as these counties are a minor percentage of the watershed (see Table 4.14.4-1).
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years.
[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands.
[e] Watershed acres were estimated by dividing the acres in the watershed by total county acres and then multiplying by the total county acres in conservation easements.
[f] For Marshall County, 118 acres of the CRP/CREP/RIM lands are jointly enrolled in the RIM and WRP.

Other Projects

Mining

A small gravel pit is located approximately 500 feet northeast of the proposed Project route near MP 853. Based on the size of the operation and lack of a processing plant at the site, it is likely to cause minor future impacts in the Red Lake River Watershed.

As discussed above, the gravel pit northeast of the proposed Project is small and does not include a processing plant. Emissions from the pit would include fugitive dust from gravel disturbance and travel on roads, and other priority pollutants from fuel combustion in the haul truck engines. Cumulative impacts to air quality from this facility would be minor.

Wind Power Development

Several wind farms are located in southern Minnesota. The American Wind Energy Association (AWEA) estimates that with wind speeds of 9.8 to 11.5 mph at 33 ft (Wind Power Class 2) the majority of the northeastern part of Minnesota has low wind power productivity potential compared to some other areas of Midwestern United States which have wind speeds of 14.3 to 15.7 mph (Wind Power Class 6) (AWEA 2002, DOE 2007a). The exceptions to this rule are the Mesabi Iron Range (St. Louis and Itasca Counties) and the Lake Superior shoreline areas (St. Louis, Lake, and Cook Counties). These areas have wind speeds of 11.5 to 12.5 mph at 33 ft (Wind Power Class 3) (DOE 2007a). Thus, development of

wind power is not considered a reasonably foreseeable action. In 2008, Minnesota Power installed ten 2.5-megawatt (MW) Clipper Wind Power turbines at Taconite Ridge Energy Center on the Mesabi Iron Range in Virginia, Minnesota, which is in St. Louis County (more than 40 miles from the proposed Alberta Clipper Project) (ALLETE 2008). The Taconite Ridge wind facility is the first commercial wind energy facility constructed in northeastern Minnesota (Renewable Energy Development 2008). It is expected to generate about 76,000 MW per year, which could produce enough power for up to 8,000 people (Renewable Energy Development 2008). According to AWEA (2008), as of August 2008, the closest wind farm in Minnesota is located in Crookston (Polk County), which is more than 20 miles from the proposed Alberta Clipper route.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Red Lake River Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.9.3 Cumulative Impacts

Prior to settlement, the Marshall, Pennington, and Red Lake Counties portion of the Red Lake River Watershed was 93 percent prairie, wetlands, and shrubland. The baseline land use was 78 percent agricultural land. The process of settlement has been characterized by conversion of native prairies, shrublands, and wetlands to agricultural lands. Of the lands crossed by the Alberta Clipper Project, 81 percent would be agricultural lands (436.8 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 48 acres would be wetlands, 32 acres would be forested, 24 acres would be grassland, and 1 acre would be shrubland. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the entire Red Lake River Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, flood control, or commercial or residential developments are currently or reasonably foreseeable within the watershed.
- Although no wind power projects are planned for Marshall, Pennington, or Red Lake Counties, the potential exists for development of transmission lines through the Red Lake River Watershed if wind power was pursued. Any transmission line development would be subject to extensive environmental review, and mitigation would be required for potentially adverse impacts to natural resources.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Red Lake River Watershed in Minnesota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.9.4 Cumulative Impacts on Identified Sensitive Resources

The following sensitive resources have been identified in the Red Lake River Watershed: the Red Lake River crossing (MP 864.3), forested areas, a calcareous fen, and wetlands.

River Crossings

The Alberta Clipper Project would cross the Red Lake River using the HDD construction method. Using the HDD method would avoid impacts to the Red Lake River.

Forested Areas

The Project route crosses numerous aspen groves in the Red Lake River Watershed. Each of these groves has been previously crossed by pipeline projects and is surrounded by agricultural land. The proposed Project would result in an increase in the cleared pathway through the groves from the current width of 125 feet to 200 feet. The cleared area would be converted to shrubland and prairie. The conversion is expected to result in a minor but long-term impact.

Calcareous Fen

A calcareous fen was discovered south of MP 853.5. The Project route was adjusted to avoid crossing the calcareous fen; consequently, the Project would not impact the fen.

Wetland with High Biological Diversity

A mixed cattail marsh wetland with high biological diversity was identified between MP 853.0 and MP 853.3. The proposed Project would cross a portion of this wetland. Enbridge has committed to consult and collaborate with MDNR to develop a plan in order to minimize impacts to this resource.

4.14.10 Clearwater River Watershed (Minnesota)

4.14.10.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Clearwater River Watershed encompasses 1,347 square miles in northwest Minnesota. The watershed spans portions of Pennington, Red Lake, Beltrami, Clearwater, Mahnomen, and Polk Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Clearwater River Watershed for approximately 52.4 miles in Beltrami, Clearwater, Polk, and Red Lake Counties within the Aspen Parklands, Hardwood Hills, and Chippewa Plains ECS subsections (Table 4.14.4-1, Figure 4.14.4-1).

Aspen Parklands ECS Subsection in Minnesota

The northwestern portion of the proposed Alberta Clipper route through the Clearwater River Watershed is in the Aspen Parklands ECS subsection. The proposed Alberta Clipper route through this ECS subsection crosses Polk and Red Lake Counties.

Historically, the Clearwater River Watershed within the Aspen Parklands ECS subsection was comprised of forest, prairie, wetlands, and shrubland (Table 4.14.10-1).

TABLE 4.14.10-1
Comparison of Pre-Settlement [a] versus Baseline [b] Environmental Conditions for the Alberta Clipper/ Southern Lights Diluent Combined Projects in the Clearwater River Watershed, Minnesota

Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Aspen Parklands					
Forest	47.20	12.54	23.37	6.21	-6.33
Shrubland	123.24	32.74	3.53	0.94	-31.80
Prairie/grassland	74.62	19.82	37.88	10.06	-9.76
Wetland	116.68	31.00	37.33	9.91	-21.09
Forested/shrub wetland	14.67	3.90	12.38	3.29	-0.61
Agricultural	0.00	0.00	258.94	68.79	+68.79
Developed	0.00	0.00	2.97	0.79	0.79
Subtotal	***376.41***	***100.00***	***376.41***	***100.00***	
GAP emergent wetland			*22.23* [d]		
GAP forested wetland			*10.26* [d]		
Hardwood Hills					
Forest	207.21	65.86	50.69	16.11	-49.75
Shrubland	69.68	22.15	5.68	1.81	-20.34
Prairie/grassland	8.30	2.64	13.25	4.21	+1.57
Wetland	14.39	4.57	36.35[d]	11.56	+6.98
Forested/shrub wetland	15.03	4.78	17.20[d]	5.47	+0.69
Agricultural	0.00	0.00	187.44	59.58	+59.58
Developed	0.00	0.00	3.97	1.26	+1.26
Subtotal	***314.61***	***100.00***	***314.58***	***100.00***	
GAP emergent wetland			*33.93* [d]		
GAP forested wetland			*10.46*[d]		
Chippewa Plains					
Forest	105.97	80.67	54.55	41.54	-39.12
Shrubland	0.00	0.00	4.34	3.31	+3.31
Prairie/grassland	0.00	0.00	0.92	0.70	+0.70
Wetland	2.69	2.05	10.33[d]	7.87	+5.82
Forested/shrub wetland	22.71	17.29	11.15[d]	8.49	-8.80
Agricultural	0.00	0.00	48.89	37.23	+37.23
Developed	0.00	0.00	1.13	0.86	+0.86
Subtotal	***131.37***	***100.00***	***131.31***	***100.00***	
GAP emergent wetland			*10.54* [d]		
GAP forested wetland			*8.77* [d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested primary components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate similar but slightly higher acreage of both emergent and forested wetlands when compared to GAP. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

Hardwood Hills ECS Subsection in Minnesota

The Hardwood Hills ECS subsection contains the middle portion of the proposed Alberta Clipper route through the Clearwater River Watershed. The proposed Alberta Clipper route through the Hardwood Hills ECS subsection in the Clearwater River Watershed crosses Polk and Clearwater Counties.

Historically, the Clearwater River Watershed within the Hardwood Hills ECS subsection was comprised of forest and shrubland (Table 4.14.10-1).

Chippewa Plains ECS Subsection in Minnesota

The Chippewa Plains ECS subsection contains the southeast portion of the proposed Alberta Clipper route through the Clearwater River Watershed. The proposed Alberta Clipper route through the Chippewa Plains ECS subsection in the Clearwater River Watershed crosses Clearwater and Beltrami Counties.

Historically, most of the Clearwater River Watershed within the Chippewa Plains ECS subsection was comprised of forest and forested wetland (Table 4.14.10-1).

Demographics

Red Lake County is sparsely populated, with a population of approximately 4,100. Red Lake County's population decreased 4.2 percent from 2000 to 2007 (U.S. Census Bureau 2009). Red Lake Falls is the county seat and the largest town, with approximately 1,600 residents (U.S. Census Bureau 2000).

Polk County is rural, with a population of approximately 30,700. The population of Polk County decreased 2.1 percent from 2000 to 2007 (U.S. Census Bureau 2009). Crookston is the county seat and the largest town, with approximately 8,200 residents (U.S. Census Bureau 2000).

Clearwater County is sparsely populated, with a population of approximately 8,200 people. The Clearwater County population decreased slightly (2.1 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Bagley and Clearbrook are the largest towns in the county (U.S. Census Bureau 2000).

Beltrami County has a population of approximately 43,600 people. From 2000 to 2007, the Beltrami County population increased by 10.0 percent (U.S. Census Bureau 2009). The largest towns in Beltrami County are Bemidji and Blackduck (U.S. Census Bureau 2000).

4.14.10.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project route crosses the Clearwater River Watershed from approximately MP 873.9 to MP 925.6, for a total of 52.4 miles. Most of the proposed Alberta Clipper route in the Clearwater River Watershed would cross existing agricultural land. Table 4.14.10-2a compares the existing land use estimates for the Clearwater River Watershed in the Aspen Parklands, Hardwood Hills, and Chippewa Plains ECS subsections for the route north of Clearbrook, Minnesota with the effects of the proposed Alberta Clipper Project.

TABLE 4.14.10-2a Cumulative Effect of Combined Enbridge Projects in the Clearwater River Watershed – Red Lake and Polk Counties, Minnesota									
Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. LSr Perm. ROW[d] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Aspen Parklands									
Forest	23,370	15.60	10.41	12.60	6.59	45.20	-45.20	-45.20	-0.19
Shrubland	3,530	1.05	0.70	0.85	0.58	3.18	25.78	+22.60	0.64
Prairie/ grassland	70,344	17.14	11.42	10.75	5.21	44.52	67.12	+22.60	0.03
Wetland	49,040	35.51	23.68	22.40	10.21	91.80	93.40	+1.60	0.00
Forested wetland	12,380	0.23	0.15	0.82	0.40	1.60	-1.60	-1.60	-0.01
Agriculture	214,766	132.06	88.05	86.46	44.05	350.62	350.65	0.00	0.00
Developed	2,970	1.43	0.96	0.71	0.35	3.45	3.44	0.00	0.00
Subtotal	*376,400*	*203.02*	*135.37*	*134.59*	*67.39*	*540.37*	*540.40*	*0.00*	*NA*
Hardwood Hills									
Forest	50,690	6.85	2.73	11.18	8.21	28.97	-28.97	-28.97	-0.06
Shrubland	5,680	2.79	0.56	0.53	1.12	5.00	19.48	14.49	0.26
Prairie/ grassland	36,645	2.06	0.37	1.29	0.98	4.70	19.19	14.49	0.04
Wetland	40,194	6.46	1.36	3.02	3.35	14.19	23.56	9.37	0.02
Forested wetland	17,200	4.82	1.61	1.07	1.87	9.37	-9.37	-9.37	-0.05
Agriculture	161,201	54.56	10.80	29.45	25.33	120.13	120.13	0.00	0.00
Developed	3,970	0.06	0.00	0.00	0.00	0.07	0.07	0.00	0.00
Subtotal	*314,580*	*77.60*	*17.43*	*46.54*	*40.86*	*182.42*	144.09	0.01	NA
Chippewa Plains									
Forest	54,550	35.25	10.08	44.12	29.55	119.00	-119.00	-119.00	-0.22
Shrubland	4,340	13.07	3.09	6.15	6.49	28.80	88.30	59.50	1.37
Prairie/ grassland	2,969	1.01	0.30	0.00	0.16	1.47	60.97	59.50	2.00
Wetland	10,362	4.71	1.28	1.26	3.86	11.11	21.67	10.56	0.10
Forested wetland	11,150	5.34	1.5	2.05	1.67	10.56	-10.56	-10.56	-0.09
Agriculture	46,809	42.98	10.03	24.24	23.72	100.97	100.97	0.00	0.00
Developed	1,130	0.37	0.09	0.27	0.92	1.65	1.65	0.00	0.00
Subtotal	*131,310*	*102.73*	*26.37*	*78.09*	*66.37*	*273.56*	*144.00*	*0.00*	*NA*
Total	**822,290**	**383.00**	**179.00**	**259.00**	**175.00**	**996.00**	**814.00**	**0.01**	**NA**

TABLE 4.14.10-2a (continued)
Cumulative Effect of Combined Enbridge Projects in the Clearwater River Watershed – Red Lake and Polk Counties, Minnesota

[a] Ecological Classification System (ECS) data from Table 4.14.10-1 were adjusted to include an estimated 67,570 acres of Conservation Reserve Program (CRP) lands (Table 4.14.10-3) that were converted from cropland to wetland (23 percent, 9,833 acres; 3 percent, 796 acres; and 2 percent, 32 acres) and grassland (77 percent, 32,464 acres, 97 percent, 22,395 acres, and 98 percent, 2,049 acres) for the Aspen Parklands, Hardwood Hills, and Chippewa Plains ECS subsections, respectively. An additional 4,925 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage (see Table 4.14.10-3). CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Red Lake and Polk Counties by the percentage of each county in the Aspen Parklands, Hardwood Hills, and Chippewa Plains ECS subsections in the Clearwater River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.10-1, see also Table 4.14.10-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

[d] The LSr and Alberta Clipper Projects would require additional permanent easements (50 feet and 25 feet, respectively) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland. Approximately 2.16 acres of forested wetland would be avoided by using horizontal directional drilling methods.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions. Values in parentheses for forest and forested wetland indicate the actual increase in forested resources resulting from the mitigation of trees at 2:1 ratio, offsetting the reduction in forest resources along the right-of-way, and increasing the total resource by the amount taken.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

The baseline land use was 60 percent agricultural land, 16 percent forest, 6 percent prairie, and 15 percent wetlands. In the Clearwater River Watershed, north of Clearbrook, shrubland would increase by approximately 2 percent, prairie would increase by approximately 2 percent, and forestland would decrease less than 0.5 percent.

In order to adequately assess impacts to land use within the Clearwater River Watershed, two separate cumulative effects tables are presented (Tables 4.14.10-2a and 4.14.10-2b). This is because the proposed Alberta Clipper route from Neche, North Dakota to Clearbrook, Minnesota (within the Clearwater River Watershed) would be constructed a year apart from the LSr Project (the LSr pipeline was completed in 2008). Therefore, impacts in Table 4.14.10-2a were assessed separately from the LSr Project. However, the proposed Alberta Clipper Route from Clearbrook, Minnesota south to Superior, Wisconsin would be constructed at the same time as the Diluent Project. Therefore, Table 4.14.10-2b presents potential impacts from both projects combined.

In the Clearwater River Watershed south of Clearbrook, Minnesota, shrubland would increase by approximately 1 percent, prairie would increase by approximately 1.3 percent, and forestland would decrease less than 0.2 percent.

State and County Highway Development

Available information does not indicate that road construction or road widening is planned for Beltrami, Clearwater, Polk, or Red Lake Counties that would affect wetlands or other natural resources (Forsland 2008).

TABLE 4.14.10-2b Cumulative Effect of Combined Enbridge Projects in the Clearwater River Watershed – Beltrami and Clearwater Counties, Minnesota								
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b] (acres)**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover (percent)[h]**
Hardwood Hills								
Forest	50,690	9.42	2.08	6.73	18.23	0.00	-18.23	-0.04
Shrubland	5,680	2.79	0.56	0.84	4.19	13.30	9.11	0.16
Prairie / grassland	35,645	2.06	0.92	1.02	4.00	13.11	9.11	0.03
Wetland	40,194	3.89	2.01	4.33	10.23	22.59	12.36	0.03
Forested wetland	17,200	8.06	1.06	3.24	12.36	0.00	-12.36	-0.07
Agriculture	161,201	51.32	10.80	24.46	86.58	86.58	0.00	0.00
Developed	3,970	0.06	0.00	0.00	0.06	0.06	0.00	0.00
Subtotal	*341,580*	*77.60*	*17.43*	*40.61*	135.64	*135.64*	0.00	NA
Chippewa Plains								
Forest	54,550	33.59	10.43	28.64	72.66	0.00	-72.66	-0.13
Shrubland	4,340	13.07	3.09	6.34	22.50	58.83	36.33	0.84
Prairie / grassland	2,969	2.64	0.13	0.18	2.95	39.28	36.33	1.22
Wetland	10,362	6.37	0.93	5.09	12.39	17.86	5.47	0.05
Forested wetland	11,150	3.71	1.67	0.09	5.47	0.00	-5.47	-0.05
Agriculture	46,809	42.98	10.03	20.59	73.60	73.60	0.00	0.00
Developed	1,130	0.37	0.09	0.22	0.68	0.68	0.00	0.00
Subtotal	*131,310*	*102.73*	*26.37*	*61.14*	190.24	*190.24*	0.00	NA
Total	**445,890**	**180.33**	**43.80**	**101.76**	**325.89**	**325.89**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.10-1 were adjusted to include an estimated 25,272 acres of Conservation Reserve Program (CRP) lands (Table 4.14.10-3) that were converted from cropland to wetland (3 percent, 796 acres and 2 percent, 32 acres) and grassland (97 percent, 22,395 acres and 98 percent, 2,049 acres) for the Hardwood Hills and Chippewa Plains ECS subsections, respectively. An additional 3,048 acres enrolled in the Wetlands Reserve Program (WRP) were added to the wetland acreage (see Table 4.14.10-3). CRP/WRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Clearwater and Beltrami by the percentage of each county in the Hardwood Hills and Chippewa Plains ECS subsections in the Clearwater River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.10-1, see also Table 4.14.10-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) is 125 feet wide and carries five pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the 75-foot-wide Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge increased the width of the permanent easement from 75 to 125 feet. The acreages reported in this column represent estimated land use in the 50-foot-wide Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total 200-foot-wide permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreages would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions. Values in parentheses for forest and forested wetland indicate the actual increase in forested resources resulting from the mitigation of trees at 2:1 ratio, offsetting the reduction in forest resources along the right-of-way, and increasing the total resource by the amount taken.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

Residential and Commercial Development Projects

No known residential or commercial projects are planned for Beltrami, Clearwater, Polk, or Red Lake Counties.

Flood Control Projects

No major flood control projects are planned for the Clearwater River Watershed in Beltrami, Clearwater, Polk, or Red Lake Counties. Therefore, flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of riparian easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

As shown in Table 4.14.10-3, 67,570 acres within the Red Lake, Polk, Clearwater, and Beltrami County portions of the Clearwater River Watershed have been enrolled in the CRP, the CREP, or the RIM program. In addition, approximately 4,925 acres of formerly farmed wetlands in the Clearwater River Watershed in these counties were taken out of production and converted to wetlands under the WRP as part of the WCA.

Other Projects

MinnCan Crude Oil Pipeline

The MinnCan Crude Oil Pipeline Project began construction in August 2007. Pipeline installation was completed in September 2008 (MinnCan 2009). The MinnCan pipeline originates close to the Enbridge Clearbrook Terminal and follows a southeasterly route to Rosemount, Minnesota. The MinnCan pipeline route does not intersect the proposed Project route but crosses the Clearwater River Watershed. The MinnCan pipeline route is expected to be restored for a growing season before the proposed Project construction potentially begins in the Clearbrook area in summer/fall 2009. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Clearwater River Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

TABLE 4.14.10-3 Land in Conservation Programs in Clearwater River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]						
County	**Total County Acres**	**Watershed Acres in County[b]**	**CRP/CREP/RIM Acres in County[c]**	**WRP Acres in County[d]**	**CRP/CREP/RIM Acres in Watershed[e]**	**WRP Acres in Watershed[e]**
Aspen Parklands						
Red Lake	277,184	179,130	45,255	5	29,246	3
Polk	1,279,437	114,600	145,709	20,923	13,051	1,874
Subtotal	*1,556,621*	*293,730*	*190,964*	*20,928*	*42,297*	*1,877*
Hardwood Hills						
Polk	1,279,437	186,370	145,709	20,923	21,225	3,048
Clearwater	658,995	109,840	11,799[f]	0	1,967	0
Subtotal	*1,938,432*	*296,210*	*157,508*	*20,923*	*23,191*	*3,048*
Chippewa Plains						
Clearwater	658,995	101,590	11,799[f]	0	1,819	0
Beltrami	1,954,893	28,960	17,708	0	262	0
Subtotal	*2,613,888*	*130,550*	*29,508*	*0*	*2,081*	*0*
Total					**67,570**	**4,925**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the Clearwater River Watershed and stated Ecological Classification System subsections were determined by GIS query. Pennington and Mahnomen Counties are not included because they are a minor percentage of the watershed (see Table 4.14.4-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

[f] For Clearwater County, 151 acres of the CRP/CREP/RIM lands are jointly enrolled in the RIM and WRP.

4.14.10.3 Cumulative Impacts

Prior to settlement, the Red Lake, Polk, Clearwater, and Beltrami County portions of the Clearwater River Watershed were 77 percent forest, shrubland, and prairie. The baseline land use was 60 percent agricultural land. The process of settlement has been characterized by conversion of native prairies, shrublands, and wetlands to agricultural lands. Of the lands crossed by the Alberta Clipper Project north of Clearbrook, 57 percent would be agricultural lands. Of the remaining lands that would be disturbed by the Alberta Clipper Project north of Clearbrook, 193 acres would be forested, 51 acres would be prairie, and 139 acres would be wetlands. Of the lands crossed by the Alberta Clipper Project south of Clearbrook, 49 percent would be agricultural lands. Of the remaining lands that would be disturbed by the Alberta Clipper Project south of Clearbrook, 91 acres would be forested, 40 acres would be wetlands, and 27 acres would be shrubland.

In the Clearwater River Watershed north of Clearbrook, Minnesota, forest would decrease by about 0.5 percent, and prairie and shrubland would increase by about 2 percent each. In the Clearwater River

Watershed south of Clearbrook, Minnesota, shrubland would increase by approximately 1 percent, prairie would increase by approximately 1.2 percent, and forestland would decrease less than 0.2 percent.

The proposed Alberta Clipper Project would impact approximately 0.2 percent of the total acreage of the entire Clearwater River Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, flood control, or commercial or residential developments are currently or reasonably foreseeable in the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Clearwater River Watershed in Minnesota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.10.4 Cumulative Impacts on Identified Sensitive Resources

The following sensitive resources have been identified in the Clearwater River Watershed: crossing the Clearwater River (MP 875.4 and MP 922.3), crossing the Lost River (MP 885.8 and MP 904.0), and wetlands associated with Silver Creek (MP 907.1 to MP 907.7).

River Crossings

The Alberta Clipper Project would cross the Clearwater River (MP 875.4) using HDD construction methods. Using HDD would avoid impacts. The proposed Project would also cross the Clearwater River at MP 922.3 using the dry crossing method (dam-and-pump or flume). This method could temporarily increase erosion and sedimentation within the crossed waterbodies; however, impacts would be minimized through BMPs such as sediment control barriers.

The proposed Project would also cross the Lost River (MP 885.8 and MP 904.0) and Silver Creek (MP 907.1 to MP 907.7) using dry crossing methods (dam-and-pump or flume). Dam-and-pump methods could temporarily increase erosion and sedimentation in the crossed waterbodies. However, impacts would be minimized through BMPs such as sediment control barriers.

Wetland Habitat

The Alberta Clipper Project would cross wetlands associated with the Silver Creek crossing from MP 907.1 to MP 907.7. Dozens of wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way could not be reestablished during operations. Compensatory mitigation may be required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed (such as the MinnCan project). In addition, as stated in Section 4.4.3, Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear

infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

4.14.11 Mississippi River Headwaters Watershed (Minnesota)

4.14.11.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Mississippi River Headwaters Watershed encompasses 1,942 square miles in north-central Minnesota. The watershed spans portions of the LLR as well as Clearwater, Beltrami, Hubbard, Cass, and Itasca Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Mississippi River Headwaters Watershed for approximately 55.5 miles; the majority of the route is within the Chippewa Plains ECS subsection, and a small portion is in the St. Louis Moraines ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

Chippewa Plains ECS Subsection in Minnesota

The proposed Alberta Clipper route through the Chippewa Plains ECS subsection and Mississippi River Headwaters Watershed crosses the LLR and four counties: Beltrami, Hubbard, Itasca, and Cass.

Historically, the Mississippi River Headwaters Watershed within the Chippewa Plans ECS subsection was comprised of forestland (61 percent) and forested and emergent wetlands (40 percent) (Table 4.14.11-1).

St. Louis Moraines ECS Subsection in Minnesota

The proposed Alberta Clipper route through the St. Louis Moraines ECS subsection in the Mississippi River Headwaters Watershed crosses the LLR and Itasca County.

Prior to settlement of the area, the Mississippi River Headwaters Watershed within the St. Louis Moraines ECS subsection was comprised of forestland (76 percent) and various types of wetlands (24 percent) (Table 4.14.11-1).

Leech Lake Reservation

The proposed Alberta Clipper route through the Mississippi River Headwaters Watershed would cross the LLR for approximately 25 miles, all within the Chippewa Plains ECS (Table 4.14.4-1).

TABLE 4.14.11-1 Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Mississippi River Headwaters Watershed – Clearwater, Beltrami, Hubbard, Cass, and Itasca Counties, Minnesota					
	Pre-Settlement Conditions		**Baseline Conditions**		
Ecological Classification System (ECS) Subsection/ Land Use	**Pre-Settlement Acreage (thousands)**	**Relative Percentage for ECS (%)**	**GAP Land Use or NWI Acreage[c] (thousands)**	**Relative Percentage for Watershed (%)**	**Percentage Change Pre-Settlement to Baseline (%)**
Chippewa Plains					
Forest	633.15	60.49	480.90	45.95	-14.54
Shrubland	0.00	0.00	28.37	2.71	2.71
Prairie/grassland	0.00	0.00	3.00	0.29	0.29
Wetland	181.29	17.32	215.21 [d]	20.56	3.24
Forested/shrub wetland	232.34	22.20	188.13 [d]	17.97	-4.22
Agricultural	0.00	0.00	120.01	11.47	11.47
Developed	0.00	0.00	11.04	1.05	1.05
Subtotal	***1,046.78***	***100.00***	***1,046.66***	***100.00***	
GAP emergent wetland			*205.02* [d]		
GAP forested wetland			*189.40* [d]		
St. Louis Moraines					
Forest	97.79	75.69	74.36	57.56	-18.13
Shrubland	0.00	0.00	7.14	5.53	5.53
Prairie/grassland	0.00	0.00	5.40	4.18	4.18
Wetland	18.70	14.47	26.43 [d]	20.46	5.98
Forested/shrub wetland	12.71	9.84	14.26 [d]	11.04	1.20
Agricultural	0.00	0.00	1.51	1.17	1.17
Developed	0.00	0.00	0.09	0.07	0.07
Subtotal	***129.20***	***100.00***	***129.19***	***100.00***	
GAP emergent wetland			*26.02* [d]		
GAP forested wetland			*13.11* [d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

Demographics

Clearwater County is sparsely populated with a population of approximately 8,200 people. The population of Clearwater County slightly decreased (2.1 percent) from 2000 to 2007 (U.S. Census Bureau 2009). Bagley and Clearbrook are the largest towns in the county (U.S. Census Bureau 2000).

Beltrami County has a population of approximately 43,600 people. The population of Beltrami County increased 10.0 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Beltrami County are Bemidji and Blackduck (U.S. Census Bureau 2000).

Hubbard County has a population of approximately 18,800 people. Hubbard County population increased over 2.2 percent from 2000 to 2007 (U.S. Census Bureau 2009). Park Rapids and Akeley are the largest towns in the county (U.S. Census Bureau 2000).

Itasca County has a population of approximately 44,500 people. The population increased 1.3 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Itasca County are Grand Rapids and Cohasset (U.S. Census Bureau 2000).

The population of Cass County is approximately 28,700 people. The county population increased approximately 5.8 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Cass County are Walker and East Gull Lake (U.S. Census Bureau 2000).

4.14.11.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross in and out of the Mississippi River Headwaters Watershed from approximately MP 925.6 to MP 1005.4, for a total of 55.5 miles. Most of the proposed Alberta Clipper route in the Mississippi River Headwaters Watershed would cross forestland. Table 4.14.11-2a compares the existing land use estimates for the Mississippi River Headwaters Watershed in the Chippewa Plains and St. Louis Moraines ECS subsections with the effects of the proposed Alberta Clipper Project. Table 4.14.11-2b compares the existing land use estimates for the portion of the LLR within the Mississippi River Headwaters Watershed and Chippewa Plains ECS subsection with the effects of the proposed Alberta Clipper Project.

The baseline land use in the Chippewa Plains was 46 percent forestland; within the St. Louis Moraines ECS subsection, the baseline land use was 58 percent forestland. The process of settlement has been characterized by conversion of forestland to agricultural lands in the Chippewa Plains and to shrubland in the St. Louis Moraines ECS subsections. The lands crossed by the Alberta Clipper Project would be approximately 35 percent forestland. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 25 percent would be agricultural, 25 percent would be wetlands, and 7 percent would be shrubland.

Within the LLR (in the Mississippi River Headwaters Watershed) the lands crossed by the Alberta Clipper Project would be approximately 46 percent forestland. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 16 percent would be agricultural, 27 percent would be wetlands, and 7 percent would be shrubland. The proposed Alberta Clipper Project would impact approximately 532 acres or 0.13 percent of the LLR within the Mississippi River Headwaters Watershed.

TABLE 4.14.11-2a Cumulative Effect of Combined Enbridge Projects in the Mississippi River Headwaters Watershed – Beltrami, Cass, Hubbard, and Itasca Counties, Minnesota								
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor. (acres)[f]**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover (percent)[h]**
Chippewa Plains								
Forest	480,900	233.77	45.52	122.41	401.70	0.00	-401.70	-0.08
Shrubland	28,370	53.29	9.10	18.37	80.76	281.61	200.85	0.71
Prairie / grassland	6,686	17.65	4.82	1.95	24.42	225.27	200.85	3.0
Wetland	215,760	56.47	5.50	88.08	150.05	288.76	138.71	0.06
Forested wetland	188,130	91.59	15.08	32.04	138.71	0.00	-138.71	-0.07
Agriculture	115,774	184.79	19.43	78.42	282.64	282.64	0.00	0.00
Developed	11,040	38.41	7.24	11.90	57.55	57.55	0.00	0.00
Subtotal	*1,046,660*	*675.97*	*106.69*	*353.17*	*1,135.83*	*1,135.83*	*0.00*	NA
St. Louis Moraines								
Forest	74,360	9.88	2.71	8.12	20.71	0.00	-20.71	-0.03
Shrubland	7,140	2.56	0.86	4.18	7.60	17.95	10.35	0.15
Prairie / grassland	5,476	0.00	0.00	0.67	0.67	11.02	10.35	0.19
Wetland	26,439	0.00	0.04	4.03	4.07	9.29	5.22	0.02
Forested wetland	14,260	0.78	0.65	3.78	5.22	0.00	-5.22	-0.04
Agriculture	1,425	4.10	1.52	5.03	10.65	10.65	0.00	0.00
Developed	90	0.06	0.00	0.00	0.06	0.06	0.00	0.00
Subtotal	*129,190*	*17.38*	*5.79*	*25.81*	48.98	*48.98*	*0.00*	NA
Total	**1,175,850**	**693**	**112**	**379**	**1,185**	**1,185**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.11-1 were adjusted to include an estimated 4,321 acres of Conservation Reserve Program (CRP) lands (Table 4.14.11-3) that were converted from cropland to wetland (13 percent, 550 acres; 11 percent, 9 acres) and grassland (87 percent, 3,686 acres; 89 percent, 76 acres) for the Chippewa Plains and St. Louis Moraines ECS subsections, respectively. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP land in Beltrami, Cass, Hubbard, and Itasca Counties by the percentage of each county in the Chippewa Plains and St. Louis Moraines ECS subsections in the Mississippi River Headwaters Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.11-1, see also Table 4.14.11-2), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

TABLE 4.14.11-2b Cumulative Effect of Combined Enbridge Projects in the Leech Lake Reservation Mississippi River Headwaters Watershed – Beltrami, Cass, Hubbard, and Itasca Counties, Minnesota								
Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor. (acres)[f]	Change in Land Use[g] (acres)	Change in Existing Land Cover (percent)[h]
Chippewa Plains								
Forest	480,900	147.50	24.38	70.95	242.83	0.00	-242.83	-0.05
Shrubland	28,370	22.39	4.13	8.44	34.97	156.38	121.41	0.43
Prairie / grassland	6,686	5.50	0.99	1.14	7.62	129.04	121.41	4.05
Wetland	215,760	36.63	4.00	37.19	77.82	141.03	63.22	0.03
Forested wetland	188,130	34.38	3.67	25.17	63.22	0.00	-63.22	-0.03
Agriculture	115,774	60.29	3.79	20.79	84.86	84.86	0.00	0.00
Developed	11,040	9.17	5.71	5.45	20.33	20.33	0.00	0.00
Total	**1,046,660**	**315.85**	**46.67**	**169.13**	**531.65**	**531.65**	**0.00**	**NA**

a Ecological Classification System (ECS) data from Table 4.14.11-1 were adjusted to include an estimated 4,236 acres of Conservation Reserve Program (CRP) lands (Table 4.14.11-3) that were converted from cropland to wetland (13 percent, 550 acres) and grassland (87 percent, 3,686 acres) for the Chippewa Plains ECS subsection. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP land in Beltrami, Cass, Hubbard, and Itasca Counties by the percentage of each county in the Chippewa Plains ECS subsections in the Mississippi River Headwaters Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.11-1, see also Table 4.14.11-2), with the remainder placed in the prairie/grassland category.

b The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

c From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

d The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

e Total existing land use acreage in the total post-construction permanent easement.

f Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

g Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

h Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

State and County Highway Development

MDOT proposes to widen three sections of U.S. Highway 2 in Cass County, Minnesota. The westernmost portion includes a 1.5-mile section located approximately 2.5 miles east of Pike Bay. This portion of the proposed U.S. Highway 2 project is located approximately 3.5 miles from the proposed Alberta Clipper Project. The second portion includes a 1.5-mile section of the highway located south of Richards Townsite and east of Ryan Village in Bena, Minnesota. This section of the proposed U.S. Highway 2 project is approximately 1.5 miles from the proposed Alberta Clipper Project. The third portion of the U.S. Highway 2 project includes a 1.5-mile section of highway located south of Little Winnibigoshish Lake. This portion of the U.S. Highway 2 project is approximately 5 miles from the

proposed Alberta Clipper Project. Most of the U.S. Highway 2 widening project is planned within areas previously cleared for the highway right-of-way; however, some additional clearing of trees and brush is expected. Impacts associated with the project would be minor but long term.

The Federal Highway Administration, Forest Service, MDOT, and Beltrami County Highway Department propose to improve County State-Aid Highway (CSAH) 22 (also known as Forest Highway 52 and Turtle River Lake Road) in Beltrami County, Minnesota. This road passes through the CNF, Blackduck State Forest, and Buena Vista State Forest. CSAH 22 is approximately 1 mile north of Pimushe Lake and approximately 13 miles north of the proposed Alberta Clipper Project. The area traversed by CSAH 22 consists primarily of forests and marsh lands. The environmental assessment, issued in 2003, states that the project would result in a total vegetation impacts of 23.9 acres, including 8.5 acres of wetlands, if the preferred construction alternative is chosen (DOT 2003). Construction of this project commenced on June 17, 2008. According to a representative from MDOT, there may be another phase of construction remaining; however, no other details were available (MDOT 2009). It is expected that any remaining construction would be completed prior to initiation of construction for the proposed Alberta Clipper project.

The Federal Highway Administration, Forest Service, LLBO, and the COE propose to improve Forest Highway 3 in Beltrami and Cass Counties, Minnesota which passes through the CNF and LLR. Forest Highway 3 is also referred to as CSAH 39 in Beltrami County and CSAH 10 in Cass County. The southernmost extent of Forest Highway 3 at U.S. Highway 2 is less than 0.5 mile north of the proposed Alberta Clipper pipeline. The area traversed by Forest Highway 3 consists primarily of forests and marsh lands. Depending on the build alternative selected, this reconstruction and road widening project would result in the clearing of 25.4 to 32.4 acres of vegetation, 8.2 to 9.8 acres of which would be wetlands. Areas cleared for grading and drainage would be restored with native vegetation (DOT 2007). Construction is scheduled for fall 2009 through 2012 (MDOT 2008). Given the proximity of the proposed Alberta Clipper Project to proposed Forest Highway 3 improvements, and the potential for overlapping schedules, minor cumulative impacts could occur.

Residential and Commercial Development Projects

There are currently two potential developments in the Mississippi River Headwaters Watershed in the vicinity of the proposed Alberta Clipper route. The first potential development, near MP 937.8, has not been approved by the local government. Given the early stages of this development, potential impacts have not been reported. Commercial development in this area likely would affect upland and wetland resources; however, any wetland impacts would be subject to regulations and mitigation—thereby reducing impacts. For the second development, near MP 941.9, an encroachment agreement was prepared in July 2007 between Enbridge and the Pinnacle Mall Village Outlet for a retention pond. Impacts from this project are expected to be minor.

In addition, Otter Tail Power Company, Minnesota Power, Minnkota Power Cooperative, Xcel Energy, and Great River Energy are proposing to construct the CapX2020 Transmission Project, an approximately 68-mile, 230-kilovolt new transmission line from Bemidji, Minnesota to Grand Rapids, Minnesota. As currently proposed, this project would generally run parallel to the proposed Alberta Clipper Project along the Great Lakes Gas pipeline right-of-way. Construction typically would require a 125-foot right-of-way, and is proposed between 2009 and 2011. The transmission line generally would parallel the U.S. Highway 2 corridor, but it would be located up to approximately 6 miles south of the corridor through CNF. East of Bena, the transmission line would largely be located within the U.S. Highway 2 corridor to Cohasset. The average height of the towers for the transmission line would range from 70 to 90 feet; towers would be located approximately 0.1 to 0.2 mile apart. The impacts, especially within CNF, would primarily be associated with loss of forestland and forested wetland within the right-of-way, land use

within the footprint of the towers, visual resources, and access roads during construction and operations. According to CNF, the project also could increase fragmentation, detract from the unique ecological value of the forest, and reduce the usefulness of the Pike Bay Experimental Forest for an ongoing study and future studies. According to the MPUC individual route permit applications for the project are expected in 2009 (MPUC 2009). A DEIS is expected in August 2009 (Minnesota Office of Energy Security 2009). Section 2.4.2 of the EIS provides information on the potential for corrosion associated with the proximity of power lines to the proposed pipeline.

Flood Control Projects

MDNR's Floodplain Management Program indicated that they are not aware of any flood control programs planned for the Mississippi River Watershed (Strauss 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and positively affect riparian zones and adjacent wetlands.

The COE Reservoir Operation Plan Evaluation (ROPE) Study for the Mississippi does not currently have any construction plans for the Mississippi River Headwaters Watershed; however, they are investigating the need for flood damage reduction.

Government Conservation Programs

As shown in Table 4.14.11-3, 4,321 acres within the Mississippi River Headwaters Watershed have been enrolled in the CRP, the CREP, or the RIM program.

According to the Minnesota Board of Water and Soil Resources (MBWSR) state wetland reports for 1999 to 2003, Clearwater, Beltrami, Hubbard, Itasca, and Cass Counties reported a total of 7.5 acres of impacts to wetlands from 1999 to 2000 and a total of 75.8 acres of impacts to wetlands from 2001 to 2003 under the WCA (MBWSR 2001, 2005).

Other Projects

Mining

Northstar Materials, Inc. filed a proposal with MDNR to expand its existing gravel mining operations at the Wilton Gravel Site Project located in Wilton, Minnesota approximately 0.7 mile from the proposed Alberta Clipper route. In April 2007, MDNR determined that an EIS would not be required because the Wilton Gravel Site does not have the potential for significant environmental effects (MDNR 2007a). There is no indication that this project would contribute substantially to cumulative impacts.

Timber Harvesting

Timber from CNF is harvested and sold to mills operating in northern Minnesota. Any harvesting within CNF is conducted in accordance with the Forest Service Land and Resource Management Plan (CNF 2004) and would not be expected to substantially contribute to cumulative impacts.

TABLE 4.14.11-3 Land in Conservation Programs in Mississippi River Headwaters Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]						
County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Chippewa Plains						
Beltrami	1,954,893	399,960	17,708	0	3,623	0
Cass	1,544,115	150,170	883	0	86	0
Hubbard	639,514	130,170	1,611	0	328	0
Itasca	1,872,320	298,310	1,251	0	199	0
Subtotal	*6,010,842*	*978,610*	*21,454*	*0*	*4,236*	*0*
St. Louis Moraines						
Cass	1,544,115	16,310	883	0	9	0
Itasca	1,872,320	112,900	1,251	0	75	0
Subtotal	*3,416,435*	*129,210*	*2,134*	*0*	*85*	*0*
Total					**4,321**	**0**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the Mississippi River Headwaters Watershed were determined by GIS query.

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by total county acres and then multiplying by the total county acres in conservation easements.

Chippewa National Forest

Appendix U provides a detailed discussion of proposed and reasonably foreseeable projects associated with CNF. These projects include the Cuba Hill Resource Management Project, the Lower East Winnie Vegetation Management Project, a CNF non-native plant management program, and the Lydick Resource Management Project.

The Cuba Hill Resource Management Project, proposed by CNF, consists of various management activities south of U.S. Highway 2 and east of Minnesota Highway 371 (approximately MP 961.34 to MP 961.39 [0.21 acre]). The various management activities would include commercial harvesting, transportation projects, prescribed burns, and other activities consistent with the CNF Forest Plan. In November 2008, CNF issued a decision notice that an EIS was not necessary. If the project is approved, it would be implemented during the next 5 years. Given the proximity of the proposed Alberta Clipper Project to the Cuba Hill Resource Management Project, and the potential for overlapping schedules, minor cumulative impacts to forestland could occur.

The Lower East Winnie Vegetation Management Project, a proposed CNF project, consists primarily of timber harvesting, conversion, and planting. The project would also include road and impoundment decommissioning. The Lower East Winnie Vegetation Management Project would be located on U.S. Highway 2 from Bena, Minnesota to Ball Club, Minnesota, north to Lake Winnibigoshish and south to

the Deer River Ranger District Boundary (approximately MP 977.95 to MP 978.1 [2.36 acres]). The project was approved in September 2008 and is expected to be implemented during the next five years. Given the proximity of the proposed Alberta Clipper Project to the Lower East Winnie Vegetation Management Project, and the potential for overlapping schedules, minor cumulative impacts to forestland could occur.

In April 2008, CNF began to implement a 10-year non-native invasive plant management program. The program would identify weed control treatments (mechanical, chemical, or manual) for use along roads, utility rights-of-way, skid trails, and other areas for control of undesired plants (approximately MP 956.9 to MP 958.0 [6.7 acres]). Given the proximity of the proposed Alberta Clipper Project to the non-native invasive plant management program, and the potential for overlapping schedules, minor cumulative impacts could occur.

The Lydick Resource Management Project, a CNF project, would be located north of U.S. Highway 2 and adjacent to the proposed Alberta Clipper Project. The various management activities would include commercial harvesting, transportation projects, prescribed burns, and other activities consistent with the CNF Forest Plan. Given the proximity of the proposed Alberta Clipper Project to the Lydick Resource Management Project, and the potential for overlapping schedules, minor cumulative impacts could occur.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Mississippi River Headwaters Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

Mesaba Energy Project

Excelsior Energy, Inc. (Excelsior) has proposed a two-phased, nominal 606-megawatt electricity per phase (1,212 total megawatts), integrated gasification combined-cycle power plant to be located in northeastern Minnesota. The Mesaba Energy Project would consist of the generating station, associated support structures, and utility lines. The Mesaba Generating Station would consist of the Mesaba Energy Project (Phase I) and an identical facility (Phase II) on the same site. A joint DEIS prepared by the U.S. Department of Energy (DOE) and the Minnesota Department of Commerce was released in October 2007 (DOE 2007b). An FEIS is expected in June 2009. Excelsior has proposed two locations: the west range site near Taconite, Minnesota (the preferred site) and the east range site near Hoyt Lakes, Minnesota (the alternate site) (Figure 4.14.2-1) The west range site is located approximately 7 miles from the proposed Alberta Clipper pipeline route, within Itasca County and the Mississippi River Headwaters watershed. The east range site is located more than 50 miles from the proposed Alberta Clipper route, within St. Louis County and the St. Louis River Watershed. Due to the separation of the two projects in distance and time, some minor cumulative impacts would be expected.

Air Quality

As discussed above, the proposed expansion of the gravel mining operations near the proposed Project does not require an EIS as no significant impacts are associated with the expansion. All emissions from

the existing facility would be limited based on the current air permit. Cumulative impacts to air quality from this facility would be minor.

As discussed above, Excelsior has proposed the Mesaba Energy Project, a two-phased integrated gasification combined-cycle power plant to be located in northeastern Minnesota. Emissions from the facility at either the preferred or alternate site would be limited based on the new air permit. Based on the distances to each site from the proposed Project and the required permitting process for each project, cumulative impacts to air quality from the new power plant would be minor.

4.14.11.3 Cumulative Impacts

Prior to settlement, both the Chippewa Plains and St. Louis Moraines ECS subsections in the Mississippi River Headwaters Watershed were composed of only forested lands and wetlands. After settlement, portions of the land were converted to agricultural, developed land, and shrubland; however, 84 percent of the Chippewa Plains land is still forest or wetlands, while 89 percent of the St. Louis Moraines land remains as forest or wetlands. The primary land use that would be crossed by the Alberta Clipper Project is forestland (36 percent). Of the land crossed within the LLR (in the Mississippi River Headwaters Watershed), 46 percent would be forestland. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 25 percent would be agricultural, 25 percent would be wetlands, and 7 percent would be shrubland. The proposed Alberta Clipper Project would impact approximately 0.09 percent of the total acreage of the entire Mississippi River Headwaters Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Mississippi River Headwaters Watershed in Minnesota would be neutral relative to baseline conditions due to demographics and land use, the prevalence of agricultural land types, the availability of conservation programs, and compensatory wetland mitigation.

4.14.11.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper Project within the Mississippi River Headwaters Watershed traverses forestland (423 acres). The land uses that would be disturbed for the remainder of the route include wetlands (300 acres), agriculture (294 acres), and shrubland (88 acres). Sensitive resources in the Mississippi River Headwaters Watershed include waterbodies, forested wetlands, and sensitive plants. Sensitive waterbody crossings include the Mississippi River (MP 939.7, MP 986.0, and MP 986.1), the Pikes Bay Channel (MP 955.8), the Ball Club River Crossing (MP 989.5), and the Deer River (MP 995.3). Wetland habitat is expansive in the Mississippi River Headwaters Watershed. Wetland habitat composes approximately 21 percent of the acreage in the watershed; approximately 17 percent of the total acreage is forested wetland habitat. A draft Biological Assessment (BA) has been prepared to assess the potential impacts of the proposed Project on sensitive species in the vicinity of CNF and the LLR (Appendix W).

River Crossings

The proposed Alberta Clipper Project would cross the Mississippi River (MP 939.7, MP 986.0, and MP 986.1), the Pikes Bay Channel (MP 955.8), the Ball Club River Crossing (MP 989.5), and the Deer River (MP 995.3) via HDD technology. Using this method would avoid impacts to these waterbodies and adjacent wetlands.

Wetland Habitat

Dozens of wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way could not be reestablished during operations. Compensatory mitigation may be required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed (such as the proposed transmission project). In addition, as stated in Section 4.4.3, Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

Sensitive Species

Approximately 80 species of sensitive mammals, birds, amphibians, reptiles, fish, mollusks, insects, and plants were evaluated to assess potential impacts of the proposed Project in the vicinity of CNF and the LLR based on field surveys, available literature, and anecdotal information (Appendix W). Of these species, a dozen plants were identified by LLBO; therefore, the proposed Project may negatively affect individual plants of these species but would not affect populations. This evaluation also included determinations by CNF and MDNR (which were essentially consistent with those of LLBO but identified fewer species). Section 7 informal consultation with FWS has been completed, and FWS has concurred with the determinations presented in the EIS for federally-listed threatened, endangered, and candidate species. The draft BA identified methods to avoid or minimize potential impacts (Appendix W).

4.14.12 No Name Given / Leech Lake River Watershed (Minnesota)

4.14.12.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

Agencies use different names for this watershed. USGS lists it as the No Name Given Watershed while MDNR lists it as the Leech Lake River Watershed (USGS 2008, MDNR 2008b). The No Name Given/ Leech Lake River Watershed encompasses 1,347 square miles in northcentral Minnesota. The watershed includes portions of the LLR as well as Hubbard, Cass, and Beltrami Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the No Name Given/Leech Lake River Watershed for

approximately 24.5 miles in Hubbard and Cass Counties within the Chippewa Plains ECS subsection (Table 4.14.4-1, Figure 4.1.4-1).

Chippewa Plains ECS Subsection in Minnesota

The full length of the Alberta Clipper route through the No Name Given/Leech Lake River Watershed lies within the Chippewa Plains ECS subsection. The proposed Alberta Clipper route through this ECS subsection crosses a portion of the LLR and two counties: Hubbard and Cass.

Historically, the No Name Given/Leech Lake River Watershed in the Chippewa Plans ECS subsection was comprised of forested land (60 percent) and wetlands (40 percent) (Table 4.14.12-1).

Leech Lake Reservation

The proposed Alberta Clipper route through the No Name Given / Leech Lake River Watershed would cross approximately 17.5 miles of the LLR (Table 4.14.4-1).

Demographics

Hubbard County has a population of approximately 18,800 people; its population increased over 2.2 percent from 2000 to 2007 (U.S. Census Bureau 2009). Park Rapids and Akeley are the largest towns in the county (U.S. Census Bureau 2000).

TABLE 4.14.12-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the No Name Given / Leech Lake River Watershed – Hubbard and Cass Counties, Minnesota

Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Chippewa Plains					
Forest	212.55	59.52	177.20	49.62	-9.90
Shrubland	0.00	0.00	6.88	1.93	1.93
Prairie/grassland	0.00	0.00	0.00	0.00	0.00
Wetland	37.50	10.50	54.00[d]	15.12	4.62
Forested/shrub wetland	107.07	29.98	85.32[d]	23.89	-6.09
Agricultural	0.00	0.00	32.57	9.12	9.12
Developed	0.00	0.00	1.18	0.33	0.33
Subtotal	***357.12***	***100.00***	***357.15***	***100.00***	
GAP emergent wetland			*47.47*[d]		
GAP forested wetland			*89.47*[d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

The population of Cass County is approximately 28,700 people (U.S. Census Bureau 2009). Cass County population increased approximately 5.8 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Cass County are Walker and East Gull Lake (U.S. Census Bureau 2000).

4.14.12.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the No Name Given/Leech Lake River Watershed from MP 944.1 to MP 951.5, MP 962.9 to MP 971.7, and MP 974.3 to MP 982.5—for a total of 24.5 miles. Most of the proposed Alberta Clipper route within the No Name Given/Leech Lake River Watershed would cross forestland. Table 4.14.12-2a compares the existing land use estimates for the No Name Given/Leech Lake River Watershed in the Chippewa Plains ECS subsection with the effects of the proposed Alberta Clipper Project. Table 4.14.12-2b compares the existing land use estimates for the portion of the LLR within the No Name / Lake River Watershed and Chippewa Plains ECS subsection with the effects of the proposed Alberta Clipper Project.

TABLE 4.14.12-2a
Cumulative Effect of Combined Enbridge Projects in the No Name Given/Leech Lake River Watershed – Cass and Hubbard Counties, Minnesota

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Chippewa Plains								
Forest	177,200	131.93	29.89	88.51	250.33	0.00	-250.33	-0.14
Shrubland	6,880	17.78	0.57	7.70	26.05	151.22	125.17	1.82
Prairie / grassland	390	0.84	0.00	0.31	1.15	126.32	125.17	32.12
Wetland	54,033	45.03	5.71	77.73	128.47	231.86	103.39	0.19
Forested wetland	85,320	73.69	9.19	20.51	103.39	0.00	-103.39	-0.12
Agriculture	32,147	36.20	2.88	11.69	50.77	50.77	0.00	0.00
Developed	1,180	0.61	0.06	0.34	1.01	1.01	0.00	0.00
Total	**357,150**	**306**	**48**	**207**	**561**	**561**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.12-1 were adjusted to include an estimated 423 acres of Conservation Reserve Program (CRP) lands (Table 4.14.12-3) that were converted from cropland to wetland (8 percent, 33 acres) and grassland (92 percent, 390 acres) for the Chippewa Plains ECS subsection. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Cass and Hubbard Counties by the percentage of each county in the Chippewa Plains ECS subsection and the No Name Given / Leech Lake River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.12-1, see also Table 4.14.12-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

TABLE 4.14.12-2b Cumulative Effect of Combined Enbridge Projects in the Leech Lake Reservation No Name Given/Leech Lake River Watershed – Cass and Hubbard Counties, Minnesota								
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (%)**
Chippewa Plains								
Forest	177,200	92.82	20.76	66.99	180.57	0.00	-180.57	-0.10
Shrubland	6,880	7.10	1.73	3.05	11.88	102.16	90.29	1.31
Prairie / grassland	390	0.60	0.12	0.00	0.72	91.01	90.29	23.17
Wetland	54,033	30.41	1.03	73.66	105.10	197.04	91.94	0.17
Forested wetland	85,320	66.05	8.77	17.13	91.94	0.00	-91.94	-0.11
Agriculture	32,147	5.54	0.25	1.52	7.32	7.32	0.00	0.00
Developed	1,180	0.11	0.04	0.05	0.21	0.21	0.00	0.00
Total	**357,150**	**202.65**	**32.69**	**162.40**	**397.74**	**397.74**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.12-1 were adjusted to include an estimated 423 acres of Conservation Reserve Program (CRP) lands (Table 4.14.12-3) that were converted from cropland to wetland (8 percent, 33 acres) and grassland (92 percent, 390 acres) for the Chippewa Plains ECS subsection. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Cass and Hubbard Counties by the percentage of each county in the Chippewa Plains ECS subsection and the No Name Given / Leech Lake River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.12-1, see also Table 4.14.12-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

Approximately 50 percent of the baseline land use in the watershed was forestland. The process of settlement has been characterized by conversion of forest and wetlands to agricultural lands. Of the lands that would be crossed by the Alberta Clipper Project in the watershed, 45 percent would be upland forests (250.3 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project in the watershed, 232 acres would be wetlands, 51 acres would be agricultural, and 26 acres would be shrubland.

Within the LLR (in the No Name Given/Leech Lake River Watershed) the lands crossed by the Alberta Clipper Project would be approximately 45 percent forestland. Of the remaining lands that would be disturbed by the Alberta Clipper Project in the LLR, 2 percent would be agricultural, 50 percent would be wetlands, and 3 percent would be shrubland. The proposed Alberta Clipper Project would impact approximately 398 acres or 0.1 percent of the LLR within the No Name Given / Leech Lake Watershed.

State and County Highway Development

As stated in Section 4.14.11, MDOT is proposing to widen three sections of U.S. Highway 2 in Cass County, Minnesota. The westernmost portion includes a 1.5-mile section located approximately 2.5 miles east of Pike Bay. This portion of the proposed U.S. Highway 2 project is located approximately 3.5 miles from the proposed Alberta Clipper Project. The second portion includes a 1.5-mile section of the highway located south of Richards Townsite and east of Ryan Village in Bena, Minnesota. This section of the proposed U.S. Highway 2 project is approximately 1.5 miles from the proposed Alberta Clipper Project. The third portion of the U.S. Highway 2 project includes a 1.5-mile section of highway located south of Little Winnibigoshish Lake. This portion of the proposed U.S. Highway 2 project is approximately 5 miles from the proposed Alberta Clipper Project. Most of the U.S. Highway 2 widening project is planned within areas previously cleared for the highway right-of-way; however, some additional clearing of trees and brush is expected. Impacts associated with the project will be minor but long term.

Residential and Commercial Development Projects

As stated in Section 4.14.11, a 68-mile transmission line, known as the CapX2020 Transmission Project, has been proposed to extend from approximately Bemidji to Cohasset, Minnesota. The project generally would follow the Great Lakes Gas pipeline right-of-way. Construction typically would require a 125-foot right-of-way. The transmission line would generally parallel the U.S. Highway 2 corridor, but it would be located up to about 6 miles south of the corridor through CNF. East of Bena, the transmission line would largely be located within the U.S. Highway 2 corridor to Cohasset. The average height of the towers for the transmission line would range from 70 to 90 feet; the towers would be located approximately 0.1 to 0.2 mile apart. The impacts, especially within CNF, primarily would be associated with loss of forestland and forested wetland within the right-of-way, land use within the footprint of the towers, visual resources, and access roads during construction and operations. According to CNF, the project also could increase fragmentation, detract from the unique ecological value of the forest, and reduce the usefulness of the Pike Bay Experimental Forest for an ongoing study and future studies. According to the MPUC, individual route permit applications for the project are expected in 2009 (MPUC 2009). Section 2.4.2 of the EIS provides information on the potential for corrosion associated with the proximity of power lines to the proposed pipeline.

Flood Control Projects

MDNR's Floodplain Management Program indicated that they are not aware of any flood control programs planned for the No Name Given/Leech Lake River Watershed (Strauss 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

As shown in Table 4.14.12-3, 423 acres within the No Name Given/Leech Lake River Watershed have been enrolled in the CRP, the CREP, or the RIM program.

TABLE 4.14.12-3 Land in Conservation Programs in the No Name Given / Leech Lake River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]						
County	**Total County Acres**	**Watershed Acres in County[b]**	**CRP/CREP/RIM Acres in County[c]**	**WRP Acres in County[d]**	**CRP/CREP/RIM Acres in Watershed[e]**	**WRP Acres in Watershed[e]**
Chippewa Plains						
Cass	1,544,115	238,190	883	0	136	0
Hubbard	639,514	113,820	1,611	0	287	0
Total					**423**	**0**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the No Name Given / Leech Lake River Watershed were determined by GIS query. Beltrami County is not included because it makes up a minor percentage of the watershed (Table 4.14.4-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

According to the MBWSR state wetland reports for 1999 to 2003, Hubbard and Cass Counties reported a total of 5.9 acres of impacts to wetlands from 1999 to 2000 and a total of 4.1 acres of impacts to wetlands from 2001 to 2003 under the WCA (MBWSR 2001, 2005).

Other Projects

Timber Harvesting

Timber from CNF is harvested and sold to mills operating in northern Minnesota. Any harvesting within CNF is conducted in accordance with the Forest Service Land and Resource Management Plan (CNF 2004). Therefore, any contribution of cumulative impacts from this project would not be substantial.

Chippewa National Forest

As discussed in Section 4.14.11.2, Appendix U discusses proposed and reasonably foreseeable projects associated with CNF. These projects include the Cuba Hill Resource Management Project, the Lower East Winnie Vegetation Management Project, a CNF non-native plant management program, and the Lydick Resource Management Project.

All of these projects would be located in close proximity to the proposed Alberta Clipper Project and would be implemented within the next 5 years. Given the proximity of the proposed Alberta Clipper Project to the proposed CNF projects, and the potential for overlapping schedules, minor cumulative impacts could occur.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern

Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the No Name Given / Leech Lake Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.12.3 Cumulative Impacts

The No Name Given/Leech Lake Watershed was 60 percent forest and 40 percent wetlands prior to settlement. After settlement occurred in the watershed, forest and forested wetland acres decreased; emergent wetlands increased; and agricultural, shrubland, and developed land appeared. Nevertheless, 89 percent of the land within the watershed remains as forest or wetlands. The proposed Alberta Clipper Project would impact approximately 0.06 percent of the total acreage of the entire No Name Given / Leech Lake Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the No Name Given/Leech Lake River Watershed in Minnesota would be neutral relative to baseline conditions due to demographics and land use, the availability of conservation programs, and compensatory wetland mitigation.

4.14.12.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper Project within the No Name Given/Leech Lake River Watershed traverses forestland (250 acres). The land uses that would be disturbed for the remainder of the route include wetlands (232 acres), agricultural (51 acres), and shrubland (26 acres). Sensitive resources within the No Name Given/Leech Lake River Watershed include waterbody crossings, wetlands, and sensitive species.

River Crossings

Waterbody crossings include Upper Sucker Lake (MP 964.2), Portage Creek (MP 968.1), Bear Brook (MP 979.4), and a channel at MP 980.9 using the push-pull method. This method could temporarily increase erosion and sedimentation within the crossed waterbodies; however, impacts would be minimized through BMPs such as sediment control barriers.

Wetlands

Wetlands comprise approximately 24 percent of the acreage in the watershed; of this acreage, 61 percent is forested wetland habitat. Dozens of wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way would not be allowed to become reestablished during operations. Compensatory mitigation may be required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed (such as the proposed transmission project). In addition, as stated in Section 4.4.3, Enbridge

would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

Sensitive Species

As described in Section 4.14.11.4, approximately 80 species of sensitive mammals, birds, amphibians, reptiles, fish, mollusks, insects, and plants were evaluated to assess potential impacts of the proposed Project in the vicinity of CNF and the LLR based on field surveys, available literature, and anecdotal information. A draft BA has been prepared to assess the potential impacts of the proposed Project on sensitive species in the vicinity of CNF and LLR (Appendix W). Of these species, a dozen plants were identified by LLBO; individuals of these species may be negatively affected by the proposed Project, but populations would not be affected. This evaluation also included determinations by CNF and MDNR (which were essentially consistent with those of LLBO but identified fewer species). Section 7 informal consultation with FWS has been completed, and FWS has concurred with the determinations presented in the EIS for federally-listed threatened, endangered, and candidate species. The draft BA identified methods to avoid or minimize potential impacts (Appendix W).

4.14.13 Prairie-Willow Watershed (Minnesota)

4.14.13.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Prairie-Willow Watershed encompasses 2,008 square miles in northcentral Minnesota. The watershed includes portions of Itasca, Cass, St. Louis, Carlton, and Aitkin Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses Itasca County in the Prairie-Willow Watershed for approximately 22.2 miles within the St. Louis Moraines and the Tamarack Lowlands ECS subsections (Table 4.14.4-1, Figure 4.14.4-1).

St. Louis Moraines ECS Subsection in Minnesota

Approximately 12.3 miles of the Alberta Clipper route through the Prairie-Willow Watershed lies within the St. Louis Moraines ECS subsection. The proposed Alberta Clipper route through this subsection crosses only Itasca County.

Historically, the Prairie-Willow Watershed in the St. Louis Moraines ECS subsection was comprised of forested lands (62 percent) and emergent and forested wetlands (38 percent) (Table 4.14.13-1).

TABLE 4.14.13-1 Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Prairie-Willow Watershed – Itasca, Cass, St. Louis, Carlton, and Aitkin Counties, Minnesota					
Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
St. Louis Moraines					
Forest	423.81	62.01	340.08	49.78	-12.24
Shrubland	0.00	0.00	39.73	5.82	5.82
Prairie/grassland	0.00	0.00	43.91	6.43	6.43
Wetland	48.10	7.04	67.17	9.83	2.79
Forested/shrub wetland	211.49	30.95	177.45 [d]	25.97	-4.97
Agricultural	0.00	0.00	11.24	1.65	1.65
Developed	0.00	0.00	3.63	0.53	0.53
Subtotal	***683.40***	***100.00***	***683.21***	***100.00***	
GAP emergent wetland			63.73		
GAP forested wetland			*175.21* [d]		
Tamarack Lowlands					
Forest	97.83	25.67	77.35	20.30	-5.37
Shrubland	0.00	0.00	2.92	0.77	0.77
Prairie/grassland	0.00	0.00	58.40	15.33	15.33
Wetland	50.83	13.34	44.33 [d]	11.63	-1.70
Forested/shrub wetland	232.38	60.99	172.44 [d]	45.26	-15.73
Agricultural	0.00	0.00	25.21	6.62	6.62
Developed	0.00	0.00	0.36	0.09	0.09
Subtotal	***381.04***	***100.00***	***381.01***	***100.00***	
GAP emergent wetland			*45.41* [d]		
GAP forested wetland			*153.54* [d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

Tamarack Lowlands ECS Subsection in Minnesota

The Tamarack Lowlands ECS subsection contains approximately 9.9 miles of the Alberta Clipper route through the Prairie-Willow Watershed. The proposed Alberta Clipper route through the Tamarack Lowlands ECS subsection and the Prairie-Willow Watershed is contained completely within Itasca County.

The Prairie-Willow Watershed within the Tamarack Lowlands ECS subsection was historically comprised of forestland (26 percent) and wetlands (74 percent) (Table 4.14.13-1).

Demographics

Itasca County has a population of approximately 44,500 people. The Itasca County population increased (1.3 percent) between 2000 and 2007 (U.S. Census Bureau 2009). Grand Rapids and Cohasset are the largest towns in the county (U.S. Census Bureau 2000).

4.14.13.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the Prairie-Willow Watershed from MP 1005.6 to MP 1026.8, for a total of 22.2 miles. Most of the proposed Alberta Clipper route in the Prairie-Willow Watershed would cross forestland and prairie. Table 4.14.13-2 compares the existing land use estimates for the Prairie-Willow Watershed within the St. Louis Moraines and Tamarack Lowlands ECS subsections with the effects of the proposed Alberta Clipper Project. The baseline land use within the St. Louis Moraines ECS subsection was 49.8 percent forested land and 35.8 percent wetlands. Within the Tamarack Lowlands portion of the watershed, the baseline land use was 56.9 percent wetlands and 20.3 percent forest (Table 4.14.13-1). Most of the proposed Alberta Clipper Project would cross forest and prairie land use. The process of settlement has been characterized by conversion of forest and wetlands to prairie and agricultural lands. Of the lands crossed by the Alberta Clipper Project, 55 percent would be forest and wetlands. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 28 percent would be prairie, 11 percent would be shrubland, and 6 percent would be agricultural.

State and County Highway Development

No available information indicates any proposed road construction or road widening in Itasca County that would affect wetlands or other natural resources (Forsland 2008).

Residential and Commercial Development Projects

There are no known residential or commercial projects planned for Itasca County.

Flood Control Projects

MDNR's Floodplain Management Program indicated that they are not aware of any flood control programs planned for the Prairie-Willow Watershed (Strauss 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

TABLE 4.14.13-2
Cumulative Effect of Combined Enbridge Projects in the Prairie-Willow Watershed – Itasca County, Minnesota

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
St. Louis Moraines								
Forest	340,080	49.07	11.00	21.33	81.40	0.00	-81.40	-0.02
Shrubland	39,730	30.93	10.27	10.01	51.21	91.91	40.70	0.10
Prairie / grassland	44,116	40.43	10.88	12.51	63.82	104.52	40.70	0.09
Wetland	67,182	5.26	2.58	15.86	23.70	76.72	53.02	0.08
Forested wetland	177,450	30.65	9.57	12.80	53.02	0.00	-53.02	-0.03
Agriculture	11,022	6.44	0.03	3.98	10.45	10.45	0.00	0.00
Developed	3,630	1.36	0.00	0.00	1.36	1.36	0.00	0.00
Subtotal	*683,210*	*164.14*	*44.33*	*76.49*	*284.96*	*284.96*	0.00	NA
Tamarack Lowlands								
Forest	77,350	11.60	6.23	9.32	27.15	0.00	-27.15	-0.04
Shrubland	2,920	2.74	0.44	2.41	5.59	19.17	13.58	0.46
Prairie / grassland	58,452	43.93	8.14	15.70	67.77	81.35	13.58	0.02
Wetland	44,336	1.49	0.56	26.61	28.66	94.67	66.01	0.15
Forested wetland	172,440	46.37	4.53	15.11	66.01	0.00	-66.01	-0.04
Agriculture	25,152	8.41	1.70	4.76	14.87	14.87	0.00	0.00
Developed	360	0.08	0.12	0.01	0.21	0.21	0.00	0.00
Subtotal	*381,010*	*114.62*	*21.72*	*73.92*	210.26	*210.26*	0.00	NA
Total	**1,064,220**	**279**	**66**	**150**	**495**	**495**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.13-1 were adjusted to include an estimated 276 acres of Conservation Reserve Program (CRP) lands (Table 4.14.13-3) that were converted from cropland to wetland (5 percent, 12 acres; 10 percent, 6 acres) and grassland (95 percent, 206 acres; 90 percent, 52 acres) for the St. Louis Moraines and Tamarack Lowlands ECS subsections, respectively. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Itasca County by the percentage of each county in the St. Louis Moraines and Tamarack Lowlands ECS subsections in Prairie-Willow Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.13-1, see also Table 4.14.13-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

Government Conservation Programs

As shown in Table 4.14.13-3, 276 acres in the Prairie-Willow Watershed have been enrolled in the CRP, the CREP, or the RIM program.

TABLE 4.14.13-3
Land in Conservation Programs in Prairie-Willow Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
St. Louis Moraines						
Itasca	1,872,320	326,210	1,251	0	218	0
Subtotal	*1,872,320*	*326,210*	*1,251*	*0*	*218*	*0*
Tamarack Lowlands						
Itasca	1,872,320	86,810	1,251	0	58	0
Subtotal	*1,872,320*	*86,810*	*1,251*	*0*	*58*	*0*
Total					**276**	**0**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the Prairie-Willow Watershed and stated Ecological Classification System subsections were determined by GIS query. Aitkin, Carlton, Cass, and St. Louis Counties are not included because these are a minor percentage of the watershed (Table 4.14.4-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

According to the MBWSR state wetland reports for 1999 to 2003; Itasca County reported a total of 0.9 acre of impact to wetlands from 1999 to 2000 and a total of 10.1 acres of wetland impact from 2001 to 2003 under the WCA (MBWSR 2001, 2005).

Other Projects

Mining

US Steel is planning to expand the Keetac Mining Site located north of Keewatin, Minnesota. In August 2008, the COE announced plans to prepare an EIS. The DEIS is expected to be released to the public in spring 2009 (COE 2008). The Keetac Mining Site is located more than 20 miles from the proposed Alberta Clipper Project. Because of the distance from the proposed Project, as well as the offset in construction schedules, cumulative impacts to land use from the Keetac Mining Site expansion and the proposed Alberta Clipper Project would not be expected.

Minnesota Steel Industries, LLC (Minnesota Steel) is proposing a Taconite Mine, Concentrator, Pellet Plant, Direct Reduced Iron (DRI) Plant, and Steel Mill Project to produce sheet steel from taconite ore (MDNR 2007b). An FEIS was issued in June 2007. The proposed Minnesota Steel project is located near the town of Nashwauk, in Itasca County, Minnesota over 18 miles from the proposed Alberta Clipper Project. Because of the distance from the proposed Project, cumulative impacts to land use from the Minnesota Steel project and the proposed Alberta Clipper Project would not be expected.

Emissions from both the Keetac Mining Site expansion and the Minnesota Steel project would be limited based on the air permits for each facility. Based on the distance to each project and the air permitting process, cumulative impacts to air quality from these facilities would be minor.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline crosses the Prairie-Willow Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.13.3 Cumulative Impacts

Prior to settlement, both the St. Louis Moraines and the Tamarack Lowlands ECS subsections were made up completely of forestland and various types of wetlands. The baseline land use for the St. Louis Moraines was 86 percent forest and wetlands; the baseline land use for the Tamarack Lowlands was 77 percent forest and wetlands. The remainder of the land was mainly shrubland and grassland, with only small amounts of agricultural or developed land. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the Prairie-Willow Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Prairie-Willow Watershed in Minnesota would be neutral relative to baseline conditions due to demographics and land use, the availability of conservation programs, and compensatory wetland mitigation.

4.14.13.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper route within the Prairie-Willow Watershed traverses prairie land (132 acres). The land uses that would be disturbed for the remainder of the route include forest (109 acres), wetlands (171 acres), and shrubland (57 acres). Sensitive resources within the Prairie-Willow Watershed include waterbody crossings and wetlands.

River Crossings

The proposed Alberta Clipper Project would cross Bass Brook (MP 1004.2), the Prairie River (MP 1010.0), a tributary to the Mississippi River (MP 1016.1), the Swan River (MP 1024.2), and a tributary to the Swan River (MP 1024.7). The Prairie River would be crossed via HDD while the other rivers would be crossed via open-cut/push-pull and dry crossing methods (dam-and-pump or flume). Impacts to sensitive resources associated with crossing the Prairie River would be avoided by using the

HDD method. Open-cut and dry crossing methods could temporarily increase erosion and sedimentation within the crossed waterbodies. However, impacts would be minimized through BMPs such as sediment control barriers.

Wetlands

Expansive wetland habitat occurs in the watershed, totaling approximately 43 percent of the acreage in the watershed. Forested wetlands compose the large majority of that total (33 percent). Numerous wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way would not be allowed to become reestablished during operations. Compensatory mitigation may be required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed. In addition, as stated in Section 4.4.3, for the proposed Alberta Clipper Project, Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

4.14.14 St. Louis River Watershed (Minnesota)

4.14.14.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The St. Louis River Watershed encompasses 2,871 square miles primarily in east-central Minnesota. In Minnesota, the watershed spans portions of the FDL Reservation, and Itasca, Aitkin, St. Louis, and Carlton Counties (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the St. Louis River Watershed for approximately 54.1 miles and traverses Itasca, Aitkin, St. Louis, and Carlton Counties, including crossings of the Glacial Lake Superior Plain, Mille Lacs Uplands, North Shore Highlands, St. Louis Moraines, and Tamarack Lowlands ECS subsections (Table 4.14.4-1, Figure 4.14.4-1).

Glacial Lake Superior Plain ECS Subsection in Minnesota

Approximately 2.9 miles of the proposed Alberta Clipper route through the St. Louis River Watershed lies within the Glacial Lake Superior Plain ECS subsection. This portion of the route crosses Carlton County.

Historically, most of the St. Louis River Watershed in the Glacial Lake Superior Plain ECS subsection was comprised of forestland 97 percent), with a small percentage of wetland (about 4 percent) (Table 4.14.14-1).

TABLE 4.14.14-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the St. Louis River Watershed – Carlton County, Minnesota

Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Glacial Lake Superior Plain					
Forest	19.76	96.48	15.51	75.62	-20.86
Shrubland	0.00	0.00	0.05	0.24	0.24
Prairie/grassland	0.00	0.00	1.14	5.56	5.56
Wetland	0.20	0.98	0.75 [d]	3.66	2.68
Forested/shrub wetland	0.52	2.54	0.93 [d]	4.53	2.00
Agricultural	0.00	0.00	1.52	7.41	7.41
Developed	0.00	0.00	0.61	2.97	2.97
Subtotal	***20.48***	***100.00***	***20.51***	***100.00***	
GAP emergent wetland			*0.89* [d]		
GAP forested wetland			*1.11* [d]		
Mille Lacs Uplands					
Forest	18.57	69.03	13.15	49.83	-19.20
Shrubland	0.00	0.00	0.30	1.14	1.14
Prairie/grassland	0.00	0.00	2.69	10.19	10.19
Wetland	1.87	6.95	1.88 [d]	7.12	0.17
Forested/shrub wetland	6.46	24.01	5.46 [d]	20.69	-3.33
Agricultural	0.00	0.00	1.50	5.68	5.68
Developed	0.00	0.00	1.41	5.34	5.34
Subtotal	***26.90***	***100.00***	***26.39***	***100.00***	
GAP emergent wetland			*1.47* [d]		
GAP forested wetland			*5.87* [d]		
North Shore Highlands					
Forest	176.52	67.45	89.63	34.19	-33.26
Shrubland	0.00	0.00	26.68	10.18	10.18
Prairie/grassland	0.00	0.00	10.81	4.12	4.12
Wetland	4.79	1.83	12.04 [d]	4.59	2.76
Forested/shrub wetland	80.38	30.72	82.01 [d]	31.29	0.57
Agricultural	0.00	0.00	8.06	3.07	3.07
Developed	0.00	0.00	32.89	12.55	12.55
Subtotal	***261.69***	***100.00***	***262.12***	***100.00***	
GAP emergent wetland			*13.55* [d]		
GAP forested wetland			*76.21* [d]		

TABLE 4.14.14-1 (continued) Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the St. Louis River Watershed – Carlton County, Minnesota					
Ecological Classification System (ECS) Subsection/ Land Use	**Pre-Settlement Conditions**		**Baseline Conditions**		
	Pre-Settlement Acreage (thousands)	**Relative Percentage for ECS**	**GAP Land Use or NWI Acreage[c] (thousands)**	**Relative Percentage for Watershed (%)**	**Percentage Change Pre-Settlement to Baseline (%)**
St. Louis Moraines					
Forest	62.98	73.20	42.03	48.86	-24.34
Shrubland	0.00	0.00	4.24	4.93	4.93
Prairie/grassland	0.00	0.00	15.73	18.28	18.28
NWI wetland	2.56	2.98	5.86 [d]	6.81	3.84
NWI forested/shrub wetland	20.50	23.83	16.06 [d]	18.67	-5.16
Agricultural	0.00	0.00	1.62	1.88	1.88
Developed	0.00	0.00	0.49	0.57	0.57
Subtotal	**86.04**	**100.00**	**86.03**	**100.00**	
GAP emergent wetland			*5.76* [d]		
GAP forested wetland			*16.25* [d]		
Tamarack Lowlands					
Forest	410.33	41.43	265.56	26.81	-14.62
Shrubland	0.00	0.00	40.52	4.09	4.09
Prairie/grassland	0.00	0.00	130.94	13.22	13.22
Wetland	49.72	5.02	38.50 [d]	3.89	-1.13
Forested/shrub wetland	530.30	53.55	479.55 [d]	48.42	-5.13
Agricultural	0.00	0.00	30.78	3.11	3.11
Developed	0.00	0.00	4.58	0.46	0.46
Subtotal	**990.35**	**100.00**	**990.43**	**100.00**	
GAP emergent wetland			*46.40* [d]		
GAP forested wetland			*476.84* [d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate similar total wetland acreage; however, the acreages of emergent and forested wetlands are reversed when compared to GAP. The difference is likely due to the inclusion of wetlands with a palustrine scrub shrub component into the forested wetland category. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie/agriculture and upland forest for emergent and forested wetlands, respectively.

[d] NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

Mille Lacs Uplands ECS Subsection in Minnesota

Approximately 5.9 miles of the proposed Alberta Clipper route through the St. Louis River Watershed lies in the Mille Lacs Uplands ECS subsection. This section of the route is contained entirely within Carlton County.

Historically, the St. Louis River Watershed within the Mille Lacs Uplands ECS subsection was comprised of forestland (69 percent) and wetlands (31 percent) (Table 4.14.14-1).

North Shore Highlands ECS Subsection in Minnesota

Approximately 16.9 miles of the proposed Alberta Clipper route through the St. Louis River Watershed is in the North Shore Highlands ECS subsection. This section of the route crosses the FDL Reservation and St. Louis and Carlton Counties.

Historically, the St. Louis River Watershed within the North Shore Highlands ECS subsection was comprised of forestland (67 percent) and wetlands (33 percent) (Table 4.14.14-1).

St. Louis Moraines ECS Subsection in Minnesota

Approximately 0.6 mile of the proposed Alberta Clipper route through the St. Louis River Watershed is in the St. Louis Moraines ECS subsection. This section of the route is entirely within Itasca County.

Historically, the St. Louis River Watershed in the St. Louis Moraines ECS subsection was comprised of forestland (73 percent) and wetlands (27 percent) (Table 4.14.14-1).

Tamarack Lowlands ECS Subsection in Minnesota

Approximately 27.7 miles of the proposed Alberta Clipper route through the St. Louis River Watershed is in the Tamarack Lowlands ECS subsection. This section of the route crosses Itasca, Aitkin, and St. Louis Counties.

Historically, the St. Louis River Watershed in the Tamarack Lowlands ECS subsection was comprised of forestland (41percent) and wetlands (59 percent) (Table 4.14.14-1).

Fond du Lac Reservation

The proposed Alberta Clipper route through the FDL Reservation in the St. Louis River Watershed would cross Carlton and St. Louis Counties for approximately 12.8 miles (Table 4.14.4-1).

Demographics

Itasca County has a population of approximately 44,500 people. The Itasca County population increased 1.3 percent from 2000 to 2007 (U.S. Census Bureau 2009). Grand Rapids and Cohasset are the largest towns in the county (U.S. Census Bureau 2000).

Aitkin County has a population of approximately 15,900 people; the population increased 4.0 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Aitkin County are Aitkin and Hill City (U.S. Census Bureau 2000).

The population of St. Louis County is approximately 196,700 people. From 2000 to 2007, the population decreased by approximately 1.9 percent (U.S. Census Bureau 2009). Duluth and Hibbing are the largest towns in the county. Floodwood is the closest town to the proposed Project (U.S. Census Bureau 2000).

The population of Carlton County is approximately 33,900 people. From 2000 to 2007, the Carlton County population increased by approximately 7.0 percent (U.S. Census Bureau 2009). The largest towns in Carlton County are Cloquet and Moose Lake. The closest town to the Alberta Clipper Project route is Wrenshall (U.S. Census Bureau 2000).

4.14.14.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the St. Louis River Watershed multiple times for a total of 54.1 miles. Most of the proposed Alberta Clipper route in the St. Louis River Watershed would cross forest and wetlands. Table 4.14.14-2a compares the existing land use estimates for the St. Louis River Watershed in the Tamarack Lowlands, the North Shore Highlands, the Mille Lacs Uplands, and the Glacial Lake Superior Plain ECS subsections with the effects of the proposed Alberta Clipper Project. Table 4.14.14-2b compares the existing land use estimates for the portion of the FDL Reservation within the St. Louis River Watershed and North Shore Highlands ECS subsection with the effects of the proposed Alberta Clipper Project.

TABLE 4.14.14-2a
Cumulative Effect of Combined Enbridge Projects in the St. Louis River Watershed – Carlton, St. Louis, Itasca, and Aitkin Counties, Minnesota

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (percent)
Glacial Lake Superior Plain								
Forest	15,510	12.42	3.43	8.36	24.21	0.00	-24.21	-0.16
Shrubland	50	0.00	0.00	0.00	0.00	12.10	12.10	24.21
Prairie / grassland	1,151	4.09	0.96	3.04	8.09	20.19	12.10	1.05
Wetland	750	0.01	0.03	1.12	1.16	2.16	1.01	0.13
Forested wetland	930	0.16	0.06	0.79	1.01	0.00	-1.01	-0.11
Agriculture	1,509	8.82	2.21	5.26	16.29	16.29	0.00	0.00
Developed	610	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	*20,510*	*25.49*	*6.69*	*18.57*	*50.75*	*50.75*	*0.00*	*NA*
Mille Lacs Uplands								
Forest	13,150	16.87	6.55	12.57	35.99	0.00	-35.99	-0.27
Shrubland	300	1.40	0.25	0.09	1.74	19.73	17.99	6.00
Prairie / grassland	2,693	22.95	6.85	7.62	37.42	55.41	17.99	0.67
Wetland	1,896	0.44	0.06	6.22	6.72	18.06	11.34	0.60
Forested wetland	5,460	5.46	2.32	3.56	11.34	0.00	-11.34	-0.21
Agriculture	1,481	8.11	1.72	4.24	14.07	14.07	0.00	0.00
Developed	1,410	0.00	0.00	0.08	0.08	0.08	0.00	0.00
Subtotal	*26,390*	*55.23*	*17.75*	*34.38*	*107.36*	*107.36*	*0.00*	*NA*
North Shore Highlands								
Forest	89,630	55.43	8.66	40.64	104.74	0.00	-104.74	-0.12
Shrubland	26,680	25.29	6.42	6.73	38.44	90.81	52.37	0.20
Prairie / grassland	10,880	27.20	1.49	8.10	36.79	89.16	52.37	0.48
Wetland	12,041	10.00	0.00	64.59	74.59	224.18	149.59	1.24
Forested wetland	82,010	110.82	10.66	28.11	149.59	0.00	-149.59	-0.18
Agriculture	7,989	3.87	0.00	2.39	6.26	6.26	0.00	0.00
Developed	32,890	2.96	0.18	0.86	4.0	4.00	0.00	0.00
Subtotal	*262,120*	*235.58*	*27.41*	*151.42*	*414.41*	*414.41*	*0.00*	*NA*

TABLE 4.14.14-2a (continued)
Cumulative Effect of Combined Enbridge Projects in the St. Louis River Watershed – Carlton, St. Louis, Itasca, and Aitkin Counties, Minnesota

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (percent)
St. Louis Moraines								
Forest	42,030	58.21	0.00	1.92	60.13	0.00	-60.13	-0.14
Shrubland	4,240	2.74	0.00	0.09	2.83	32.90	30.37	0.71
Prairie / grassland	15,749	43.93	0.00	0.51	44.44	74.51	30.07	0.19
Wetland	5,860	1.25	0.00	0.71	1.96	2.62	0.66	0.01
Forested wetland	16,060	0.00	0.00	0.66	0.66	0.00	-0.66	-0.004
Agriculture	1,601	8.41	0.00	0.37	8.78	8.78	0.00	0.00
Developed	490	0.08	0.00	0.00	0.08	0.08	0.00	0.00
Subtotal	*86,030*	*114.62*	*0.00*	*4.27*	*118.89*	*118.89*	*0.00*	*NA*
Tamarack Lowlands								
Forest	265,560	34.45	19.76	26.06	80.27	0.00	-80.27	-0.03
Shrubland	40,520	20.03	2.29	6.28	28.60	68.73	40.13	0.10
Prairie / grassland	131,005	136.79	18.78	22.03	177.60	217.73	40.13	0.03
Wetland	38,503	8.48	0.33	126.72	135.53	356.68	221.15	0.57
Forested wetland	479,550	157.96	10.51	52.69	221.15	0.00	-221.15	-0.05
Agriculture	30,712	23.88	2.41	8.13	34.42	34.42	0.00	0.00
Developed	4,580	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	*990,430*	*381.59*	*54.07*	*241.91*	*677.57*	*677.57*	*0.00*	*NA*
Total	**1,385,480**	**813**	**106**	**451**	**1,369**	**1,369**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.14-1 were adjusted to include an estimated 189 acres of Conservation Reserve Program (CRP) lands (Table 4.14.14-3) that were converted from cropland to wetland (0.7 percent, 0.1 acres; 82.7 percent, 15.7 acres; 1.0 percent, 1.4 acres; 2.2 percent, 0.4 acres; 3.8 percent, 2.6 acres) and grassland (99.3 percent, 10.9 acres; 17.3 percent, 3.3 acres; 98.6. percent, 70.0 acres; 97.8 percent, 18.6 acres; and 96.2 percent, 65.4 acres) for the Glacial Lake Superior Plain, Mille Lacs Uplands, North Shore Highlands, St. Louis Moraines, and Tamarack Lowlands ECS subsections, respectively. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Carlton, St. Louis, Itasca, and Aitkin Counties by the percentage of each county in the Glacial Lake Superior Plain, Mille Lacs Uplands, North Shore Highlands, St. Louis Moraines, and Tamarack Lowlands ECS subsections and in the St. Louis River Watershed (Minnesota). This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.14-1, see also Table 4.14.14-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

TABLE 4.14.14-2b Cumulative Effect of Combined Enbridge Projects in the Fond du Lac Obijwe Indian Reservation St. Louis River Watershed – Carlton, St. Louis, Itasca, and Aitkin Counties, Minnesota									
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (percent)**
North Shore Highlands								
Forest	89,630	39.18	0.57	27.30	67.05	0.00	-67.05	-0.07
Shrubland	26,680	7.86	0.69	4.29	12.84	46.37	33.53	0.13
Prairie / grassland	10,880	19.72	0.05	6.22	25.99	59.51	33.53	0.31
Wetland	12,041	21.80	-	55.86	77.66	208.11	130.46	1.08
Forested wetland	82,010	99.45	6.40	24.61	130.46	0.00	-130.46	-0.16
Agriculture	7,989	1.99	-	1.56	3.56	3.56	0.00	0.00
Developed	32,890	2.74	0.18	0.86	3.79	3.79	0.00	0.00
Total	**262,120**	**193**	**8**	**121**	**321**	**321**	**0.00**	**NA**

a Ecological Classification System (ECS) data from Table 4.14.14-1 were adjusted to include an estimated 71 acres of Conservation Reserve Program (CRP) lands (Table 4.14.14-3) that were converted from cropland to wetland (1.4 percent, 1.0 acre) and grassland (98.6 percent, 70.0 acres) for the North Shore Highlands ECS subsection. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Carlton and St. Louis Counties by the percentage of each county in the North Shore Highlands ECS subsection and in the St. Louis River Watershed (Minnesota). This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.14-1, see also Table 4.14.14-3), with the remainder placed in the prairie/grassland category.

b The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

c From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

d The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

e Total existing land use acreage in the total post-construction permanent easement.

f Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

g Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

h Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

The baseline land use was mainly composed of forested land and wetlands within each of the five ECS subsections. However, each of those subsections contained some land use acreages described as shrubland, grassland, agricultural land, and developed land. The baseline land use in the Glacial Lake Superior Plain was 76 percent forestland, 50 percent forest in the Mille Lacs Uplands, 34 percent forest in the North Shore Highlands, 49 percent forest in the St. Louis Moraines, and 52 percent wetlands in the Tamarack Lowlands. The process of settlement has been characterized by conversion of forest to agricultural and prairie in the Glacial Lake Superior Plain, to agriculture and prairie in the Mille Lacs Uplands, to developed and shrubland in the North Shore Highlands, to prairie and shrubland in the St. Louis Moraines, and to prairie in the Tamarack Lowlands. Of the lands crossed by the Alberta Clipper Project, 66 percent would be forest and wetlands. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 22 percent would be prairie, 6 percent would be agriculture, and 5 percent would be shrubland.

Within the FDL Reservation (within the St. Louis River Watershed) the lands crossed by the Alberta Clipper Project would be approximately 21 percent forestland, 65 percent wetlands, and 8 percent prairie/grasslands. The proposed Alberta Clipper Project would impact approximately 321 acres, or 0.33 percent, of the FDL Reservation within the St. Louis River Watershed.

State and County Highway Development

No available information indicates that road construction or road widening is planned for in Itasca County.

MDOT identified two state projects that could impact wetlands in Carlton County. As these projects are still in the planning stages, the extent of wetland impacts is unknown (Forsland 2008). State Project 6982-285 involves pavement replacement and repairs, bridge replacement and repairs, and safety improvements on Interstate 35 from Boundary Avenue to 26th Avenue East, which crosses Carlton County (MDOT 2007). This project is slated for the 2009 fiscal year (MDOT 2008). The proposed Alberta Clipper Project would be over 20 miles from State Project 6982-285. Another project identified by MDOT is State Project 0121-28. This project plans to improve Truck Highway 210 in Carlton County. Construction will include mill and overlay, replacement of bridge number 4651, and safety improvements (MDOT 2007). This project is also slated for the 2009 fiscal year (MDOT 2008). Any negative impacts would be mitigated by wetland banking sites through the MBWSR.

Two highway projects with potential wetland impacts were identified in Aitkin County (Forsland 2008). State Project 0115-41 involves the replacement of two bridges over Ripple River on US 169 and would only result in very minor impacts to the floodplain. Construction is expected to occur in July 2009 (MDOT 2009). The other project (State Project 0115-40) includes plans to mill and overlay US 169 from Garrison to Aiken. Construction of this project is expected in 2010 (MDOT 2009). The wetland impacts for this project are also expected to be minor but unknown at this time (MDOT 2009). Any negative impacts will be mitigated by wetland banking sites through the MBWSR.

Residential and Commercial Development Projects

No known residential or commercial projects are planned in Itasca, Aitkin, St. Louis, or Carlton Counties that would affect wetlands or other natural resources.

Flood Control Projects

MDNR's Floodplain Management Program indicated that they are not aware of any flood control programs planned for the St. Louis River Watershed (Strauss 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

As shown in Table 4.14.14-3, 189 acres in the St. Louis River Watershed have been enrolled in the CRP, the CREP, or the RIM program.

According to the MBWSR state wetland reports for 1999 to 2003, Itasca, Aitkin, St. Louis, and Carlton Counties reported a total of 30.4 acres of impacts to wetlands from 1999 to 2000 and a total of 147.4 acres of impacts to wetlands from 2001 to 2003 under the WCA (MBWSR 2001, 2005).

TABLE 4.14.14-3 Land in Conservation Programs in St. Louis River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]						
County	**Total County Acres**	**Watershed Acres in County[b]**	**CRP/CREP/RIM Acres in County[c]**	**WRP Acres in County[d]**	**CRP/CREP/RIM Acres in Watershed[e]**	**WRP Acres in Watershed[e]**
Glacial Lake Superior Plain						
Carlton	559,738	15,450	401	0	11	0
Subtotal	*559,738*	*15,450*	*401*	*0*	*11*	*0*
Mille Lacs Uplands						
Carlton	559,738	26,900	401	0	19	0
Subtotal	*559,738*	*26,900*	*401*	*0*	*19*	*0*
North Shore Highlands						
Carlton	559,738	94,080	401	0	67	0
St. Louis	4,312,019	168,190	103	0	4	0
Subtotal	*4,871,757*	*262,270*	*504*	*0*	*71*	*0*
St. Louis Moraines						
Itasca	1,872,320	28,190	1,251	0	19	0
Subtotal	*1,872,320*	*28,190*	*1,251*	*0*	*19*	*0*
Tamarack Lowlands						
Aitkin	1,275,757	45,000	738	0	26	0
Itasca	1,872,320	30,580	1,251	0	20	0
St. Louis	4,312,019	914,780	103	0	22	0
Subtotal	*7,460,096*	*990,360*	*2,092*	*0*	*68*	*0*
Total					**189**	**0**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the St. Louis River Watershed and stated Ecological Classification System subsections were determined by GIS query (see Table 4.14.4-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

Other Projects

Mining

Several mining projects in the St. Louis River Watershed are currently under environmental review by MDNR, including the Keetac Mine Expansion Project, the Polymet NorthMet Project, and the Mesabi Nugget Project.

US Steel is planning to expand the Keetac Mining Site located north of Keewatin, Minnesota. In August 2008, the COE announced plans to prepare an EIS. The DEIS is expected to be released to the public in spring 2009 (COE 2008). The Keetac Mining Site is located more than 20 miles from the proposed Alberta Clipper Project. Because of the distance from the proposed Project, as well as the offset in

construction schedules, cumulative impacts from the Keetac Mining Site expansion and the proposed Alberta Clipper Project would not be expected.

PolyMet Mining Inc., is planning to construct an open mine pit (the NorthMet Mine), approximately 6 miles south of Babbitt, Minnesota, and an ore processing facility at a currently inactive taconite processing facility, located 5 miles north of the town of Hoyt Lakes, Minnesota (MDNR 2005). The DEIS was published in December 2008. The NorthMet Project, including the ore processing facility, is located at least 60 miles from the proposed Alberta Clipper Project. Because of the distance from the proposed Project, cumulative impacts from the NorthMet Project and the proposed Alberta Clipper Project would not be expected.

Mesabi Mining, LLC and Steel Dynamics, Inc. are proposing to reactivate portions of the former Erie Mining/LTV Steel Mining Company mine near Hoyt Lakes, Minnesota. The Mesabi Nugget Phase II Project proposes to reopen the taconite mine and construct a new concentrator. In August 2008, MDNR and the COE announced that they will prepare a joint EIS for this project. The FEIS is expected to be issued in June 2009 (MDNR 2008c). The Mesabi Nugget Phase II Project is over 50 miles northeast of the proposed Alberta Clipper Project. Because of the distance from the proposed Project, as well as the offset in construction schedules, cumulative impacts from the Mesabi Nugget Phase II Project and the proposed Alberta Clipper Project would not be expected.

Timber Harvesting

In Perch Lake Township of Carlton County, approximately 0.5 mile from the proposed Project, 35 acres of timber were sold and can be clear cut in 2009 and 2010 (Sections 6 and 7). This impact would be in addition to the forestland impacted Project-wide by the proposed Alberta Clipper Project (approximately 622.2 acres).

Mesaba Energy Project

As discussed above, Excelsior has proposed the Mesaba Energy Project, a two-phased integrated gasification combined-cycle power plant to be located in northeastern Minnesota. The 1,212-megawatt facility would be constructed in two phases of 606 megawatts per phase. The Mesaba Energy Project would consist of the generating station, associated support structures, and utility lines. The Mesaba Generating Station would consist of the Mesaba Energy Project (Phase I) and an identical facility (Phase II) on the same site. A joint DEIS prepared by DOE and the Minnesota Department of Commerce was released in October 2007 (DOE 2007b). An FEIS is expected in June 2009. Excelsior has proposed two locations: the west range site near Taconite, Minnesota (the preferred site) and the east range site near Hoyt Lakes, Minnesota (the alternate site) (Figure 4.14.2-1) The west range site is located approximately 7 miles from the proposed Alberta Clipper pipeline route, within Itasca County and the Mississippi River Headwaters watershed. The east range site is located more than 50 miles from the proposed Alberta Clipper route, within St. Louis County and the St. Louis River Watershed. Due to the separation of the two projects in distance and time, only minor cumulative impacts would be expected.

Air Quality

Emissions from the Keetac Mining Site expansion, the NorthMet Project, the Mesabi Nugget Phase II Project, and the Mesaba Energy Project would be limited based on the air permits for each facility. Based on the distance to each project, cumulative impacts to air quality from these facilities would be minor.

4.14.14.3 Cumulative Impacts

Prior to settlement, each of the five ECS subsections in the St. Louis River Watershed that would be crossed by the Project were composed of both forest and wetlands. After settlement, portions of the land were converted to shrubland, agriculture, developed land, and grassland. Nevertheless, over 50 percent of the land use within each of these ECS subsections remained as forest or wetlands. The Mille Lacs Uplands ECS subsection lost approximately 50 percent of its forestland; most of that land was converted to shrubland or developed land. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the St. Louis River Watershed (including the portions in Minnesota and Wisconsin).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- Identified current and reasonably foreseeable commercial projects in the St. Louis Watershed would require environmental review and regulatory permits, which would include mitigation measures during construction and operation to offset any impacts.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the St. Louis River Watershed in Minnesota would be neutral to positive relative to baseline conditions because of demographics and land use, the availability of conservation programs, and compensatory wetland mitigation.

4.14.14.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper Project within the St. Louis River Watershed traverses wetlands (1,269 acres). The land uses that would be disturbed for the remainder of the route in the watershed include forest (305 acres), prairie (304 acres), and shrubland (5 acres). Sensitive resources include waterbodies, wetlands, and other tribal biological resources.

River Crossings

The proposed Alberta Clipper Project would cross the Savanna River (MP 1046.0), a tributary to the St. Louis River (MP 1050.1 and MP 1052.0), the Ahmik River (MP 1052.7), a tributary to Dead Fish Lake (MP 1058.6, MP 1062.5, and MP 1064.3), a tributary to Little Otter Creek (MP 1071.2 and MP 1071.5), a pond (MP 1072.9), and Little Otter Creek (MP 1074.3). All of these rivers would be crossed via open-cut/push-pull and dry crossing methods (dam-and-pump or flume). Open-cut/push-pull and dry crossing methods could temporarily increase erosion and sedimentation within the crossed waterbodies. However, impacts would be minimized through BMPs such as sediment control barriers.

Wetlands

Wetlands compose 26 percent of the acreage in the watershed, with forested wetland habitat accounting for the large majority of that acreage (22 percent). Numerous wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way would not be allowed to become reestablished during operations. Compensatory mitigation may be

required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed. In addition, as stated in Section 4.4.3, for the proposed Alberta Clipper Project, Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

Tribal Biological Resources

Biological resources of concern identified by the FDL include wild rice, Northern white cedar, paper birch, sweetgrass, and blueberry. The currently proposed Project route would be located downstream from identified wild rice areas. Coordination with the FDL is being conducted in order to adequately protect and restore these species.

4.14.15 St. Louis River Watershed (Wisconsin)

4.14.15.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The St. Louis River Watershed encompasses approximately 66 square miles within Douglas County, Wisconsin (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the St. Louis River Watershed in Wisconsin for approximately 11.0 miles; the entire route is within the Superior Coastal Plain Ecological Landscape (Table 4.14.4-1, Figure 4.14.4-1). Wisconsin does not use the ECS designations but rather has ecological landscapes (WDNR 2006).

Superior Coastal Plain Ecological Landscape in Wisconsin

Approximately 11 miles of the Alberta Clipper route through the Wisconsin portion of the St. Louis River Watershed is in the Superior Coastal Plain ecological landscape. The entire route through this ecological landscape is within Douglas County, Wisconsin.

Historically, the St. Louis River Watershed in the Superior Coastal Plain ecological landscape was comprised of forestland (92 percent) and wetlands (7 percent) (Table 4.14.15-1).

TABLE 4.14.15-1 Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the St. Louis River Watershed – Douglas County, Wisconsin					
	Pre-Settlement Conditions		Baseline Conditions		
Land Cover	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	Wiscland Land Use Acreage (thousands)[c]	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Superior Coastal Plain					
Forest	39.91	92.38	9.44	21.88	-70.51
Shrubland	0.15	0.35	4.90	11.36	11.01
Prairie/grassland	0.00	0.00	5.68	13.16	13.16
Open water	0.00	0.00	3.12	7.23	7.23
Wetland	2.78	6.44	0.74	1.71	-4.72
Forested/shrub wetland	0.36	0.83	13.98	32.40	31.57
Agricultural	0.00	0.00	0.08	0.19	0.19
Developed	0.00	0.00	5.21	12.07	12.07
Barren (unknown)	0.35	0.81	0.00	0.00	-0.81
Subtotal	***43.20***	***100.00***	***43.15***	***100.00***	
Wiscland wetland			*0.78*		
Wiscland forested wetland			*12.85*		

[a] Pre-settlement land cover distribution was determined using the Wisconsin Native Vegetation Map (WDNR 1990).

[b] Land use was determined using the Wiscland digital data set, WDNR 2002.

[c] Wiscland acreage was modified to substitute Wisconsin Wetland Inventory acreage for Wiscland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. Wiscland wetland data are provided in italics for comparison. WWI data indicate similar total wetland acreage; however, the acreage of emergent and forested wetlands is reversed when compared to Wiscland. The difference is likely due to the inclusion of wetlands with a palustrine scrub-shrub component in the forested wetland category. The difference between Wiscland and National Wetland Inventory data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

Demographics

The population of Douglas County is approximately 43,700. The Douglas County population increased 1.0 percent from 2000 to 2007 (U.S. Census Bureau 2009). The City of Superior and the Town of Superior are the largest towns in the county (U.S. Census Bureau 2000). Superior is the closest town to the Alberta Clipper Project.

4.14.15.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project crosses the St. Louis River Watershed in Wisconsin from approximately MP 1084.8 to MP 1095.8, for a total of 11 miles. Most of the proposed Alberta Clipper route in the St. Louis River Watershed in Wisconsin would cross wetlands (52 percent). Table 4.14.15-2 compares the existing land use estimates for the St. Louis River Watershed in Wisconsin in the Superior Coastal Plain ecological landscape with the effects of the proposed Alberta Clipper Project.

The baseline land use in the Superior Coastal Plain ecological landscape was 32 percent forested/shrub wetland and 68 percent forestland. The process of settlement has been characterized by conversion of forest to wetlands, shrubland, and prairie. Of the lands crossed by the proposed Alberta Clipper Project,

52 percent would be wetlands. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 18 percent would be prairie and 20 percent would be forestland.

Substantial waterbody crossings include crossing the Pokegama River (MP 1094.4). This river would be crossed via dam-and-pump methods, which could temporarily increase erosion and sedimentation within the waterbody. However, impacts would be minimized through BMPs such as sediment control barriers.

TABLE 4.14.15-2
Cumulative Effect of Combined Enbridge Projects in the St. Louis River Watershed – Douglas County, Wisconsin

Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Superior Coastal Plain								
Forest	9,440	18.83	5.57	13.78	38.18	0.00	-38.18	-0.40
Shrubland	4,900	5.92	1.81	10.29	18.02	37.11	19.09	0.39
Prairie/ grassland	5,680	17.61	7.12	8.73	33.46	52.55	19.09	0.34
Open water	3,120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wetland	743	3.34	1.97	19.94	25.25	104.68	79.43	10.69
Forested wetland	13,980	47.14	20.22	12.07	79.43	0.00	-79.43	-0.57
Agriculture	77	0.00	0.01	0.00	0.01	0.01	0.00	0.00
Developed/ barren	5,210	3.94	1.68	0.16	5.78	5.78	0.00	0.00
Total	**43,150**	**96.78**	**38.38**	**64.97**	**200.13**	**200.13**	**0.00**	**NA**

[a] Land use data from Table 4.14.15-1 were adjusted to include an estimated 3 acres of Wetlands Reserve Program (WRP) lands (see Table 4.14.15-3). WRP acres were removed from the agriculture category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

State and County Highway Development

No highway improvement projects with known wetland or other natural resource impacts were identified in Douglas County by the Wisconsin Department of Transportation (WDOT 2008).

Residential and Commercial Development Projects

No known residential or commercial projects are planned for Douglas County.

Flood Control Projects

The WDNR Municipal Flood Control Grant Program indicated that they are not aware of any flood control programs planned for the St. Louis River Watershed in Wisconsin (WDNR 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

As shown in Table 4.14.15-3, no acreage within the St. Louis River Watershed in Wisconsin has been enrolled in the CRP, the CREP, or the RIM program. Approximately 3 acres have been enrolled in the WRP.

TABLE 4.14.15-3
Land in Conservation Programs in St. Louis River Watershed Counties in Wisconsin Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Glacial Lake Superior Plain						
Douglas	947,283	44,258	0	62	0	3
Total					**0**	**3**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] Conservation lands data obtained from NRCS (2009b).
[b] County acres within the St. Louis River Watershed and stated Ecological Classification System subsections were determined by GIS query (see Table 4.14.4-1).
[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: NRCS 2009b.
[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: NRCS 2009b.
[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

According to the Wisconsin Legislative Audit Bureau (2008), 23.2 percent of land (194,200 acres) in Douglas County, Wisconsin is classified as wetland. From January 2001 through June 2006, the Wisconsin Legislative Audit Bureau (2008) estimated that 113.4 acres in the northern WDNR region were disturbed through permits (includes both permanent losses and temporary disturbances). If it is assumed that these disturbances were distributed evenly throughout the wetlands in this region, then roughly 10 acres of Douglas County wetlands were disturbed during this period.

4.14.15.3 Cumulative Impacts

Prior to settlement, most of the Superior Coastal Plain ecological landscape within the St. Louis River Watershed in Wisconsin was composed of forested lands and wetlands. After settlement, portions of the land were converted to developed and shrubland; however, 56 percent of the Superior Coastal Plain land remains in forest or wetlands. Of the lands crossed by the Alberta Clipper Project, 52 percent would be

wetlands. Of the remaining lands that would be disturbed by the Alberta Clipper Project, 17 percent would be prairie and 19 percent would be forestland. Less than 0.1 percent would be agricultural. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the St. Louis River Watershed (including the portions in Minnesota and Wisconsin).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources in the St. Louis River Watershed in Wisconsin would be neutral relative to baseline conditions due to demographics and land use, the availability of conservation programs, and compensatory wetland mitigation.

4.14.15.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper Project in the St. Louis River Watershed traverses wetlands (105 acres). The land uses that would be disturbed for the remainder of the route include prairie lands (33 acres), agriculture (0.01 acre), and forest (38 acres). Sensitive resources include waterbodies, wetlands, and biological resources traditionally used by the FDL.

River Crossings

The proposed Alberta Clipper Project would cross the Pokegama River (MP 1094.4). This river would be crossed via dry crossing methods (dam-and-pump or flume), which could temporarily increase erosion and sedimentation within the waterbody. However, impacts would be minimized through BMPs such as sediment control barriers.

Wetlands

Wetlands compose the majority of the land that would be crossed by the proposed Project in the watershed (105 total acres). Expansive wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way would not be allowed to become reestablished during operations. Compensatory mitigation may be required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed. In addition, as stated in Section 4.4.3, for the proposed Project, Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to

the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

4.14.16 Kettle River Watershed (Minnesota)

4.14.16.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Kettle River Watershed encompasses 1,028 square miles in east-central Minnesota. The portion of the watershed crossed by the proposed Project is completely within Carlton County (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Kettle River Watershed in Carlton County for approximately 0.1 mile and crosses a portion of the FDL Reservation and the North Shore Highlands ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

North Shore Highlands ECS Subsection in Minnesota

Approximately 0.1 mile of the Alberta Clipper route through the Kettle River Watershed would cross a portion of the FDL Reservation and the North Shore Highlands ECS subsection. The proposed Alberta Clipper route through this subsection is contained completely within Carlton County.

Historically, the Kettle River Watershed in the North Shore Highlands ECS subsection was comprised of forestland (47 percent) and wetlands (53 percent) (Table 4.14.16-1).

TABLE 4.14.16-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Kettle River Watershed – Carlton County, Minnesota

Ecological Classification System (ECS)Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
North Shore Highlands					
Forest	13.11	46.65	6.85	24.39	-22.26
Shrubland	0.00	0.00	0.12	0.43	0.43
Prairie/grassland	0.00	0.00	1.87	6.66	6.66
Wetland	0.43	1.53	1.25 [d]	4.45	2.92
Forested/shrub wetland	14.56	51.81	16.16 [d]	57.55	5.73
Agricultural	0.00	0.00	1.74	6.20	6.20
Developed	0.00	0.00	0.09	0.32	0.32
Subtotal	***28.10***	***100.0***	***28.08***	***100.0***	
GAP emergent wetland			*1.61* [d]		
GAP forested wetland			*15.22* [d]		

a Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

b Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

c GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate similar total wetland acreage; however, the acreages of emergent and forested wetlands are reversed when compared to GAP. The difference is likely due to the inclusion of wetlands with a palustrine scrub shrub component into the forested wetland category. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

d NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

Fond du Lac Reservation

The proposed Alberta Clipper route through the Kettle River Watershed would cross the FDL Reservation for approximately 0.1 mile (Table 4.14.4-1).

Demographics

The population of Carlton County is approximately 33,900; the population increased approximately 7.0 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Carlton County are Cloquet and Moose Lake (U.S. Census Bureau 2000).

4.14.16.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the Kettle River Watershed from MP 1069.6 to MP 1069.7, for a total of 0.1 mile. Most of the proposed Alberta Clipper route in the Kettle River Watershed is within prairie/grasslands. Table 4.14.16-2a compares the existing land use estimates for the Kettle River Watershed in the North Shore Highlands ECS subsection with the effects of the proposed Alberta Clipper Project. Table 4.14.16-2b compares the existing land use estimates for the portion of the FDL Reservation within the Kettle River Watershed and North Shore Highlands ECS subsection with the effects of the proposed Alberta Clipper Project.

The baseline land use was 62 percent wetlands. Of the lands crossed by the Alberta Clipper Project, 73 percent would be prairie/grasslands (0.7 acre). Of the remaining lands that would be disturbed by the Alberta Clipper Project, less than 0.1 acre would be wetlands, and 0.2 acre would be forestlands. Within the FDL Reservation (in the Kettle River Watershed) the lands crossed by the Alberta Clipper Project would be approximately 73 percent prairie/grasslands and 25 percent forestlands. The proposed Alberta Clipper Project would impact approximately 1 acre (less than 0.1 percent) of the FDL Reservation within the Kettle River Watershed.

State and County Highway Development

As stated in Section 4.14.14.2, MDOT identified two state projects which could impact wetlands in Carlton County (Forsland 2008). As these projects are still in the planning stages the extent of wetland impacts is unknown. However, any negative impacts would be mitigated by wetland banking sites through the MBWSR.

Residential and Commercial Development Projects

No known residential or commercial projects are planned for Carlton County.

Flood Control Projects

MDNR's Floodplain Management Program indicated that they are not aware of any flood control programs planned for the Kettle River Watershed (Strauss 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

TABLE 4.14.16-2a Cumulative Effect of Combined Enbridge Projects in the Kettle River Watershed – Carlton County, Minnesota								
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (%)**
North Shore Highlands								
Forest	6,850	0.07	0.00	0.17	0.24	0.00	-0.24	0.00
Shrubland	120	0.00	0.00	0.00	0.00	0.12	0.12	0.10
Prairie / grassland	1,890	0.25	0.00	0.46	0.71	0.83	0.12	0.01
Wetland	1,250	0.00	0.00	0.02	0.02	0.02	0.00	0.00
Forested wetland	16,160	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	1,720	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Developed	90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**28,080**	**0.32**	**0.00**	**0.65**	**0.97**	**0.97**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.16-1 were adjusted to include an estimated 20 acres of Conservation Reserve Program (CRP) lands (Table 4.14.16-3) that were converted from cropland to wetland (1 percent, 0.2 acres) and grassland (99 percent, 19.8 acres) for the North Shore Highlands ECS subsection. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP land in Carlton County by the percentage of each county in the North Shore Highlands ECS subsection and the Kettle River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.16-1, see also Table 4.14.16-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

TABLE 4.14.16-2b Cumulative Effect of Combined Enbridge Projects in the Fond du Lac Reservation Kettle River Watershed – Carlton County, Minnesota								
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (%)**
North Shore Highlands								
Forest	6,850	0.07	-	0.17	0.24	0.00	-0.24	0.00
Shrubland	120	-	-	-	0.00	0.12	0.12	0.10
Prairie / grassland	1,890	0.25	-	0.46	0.71	0.83	0.12	0.01
Wetland	1,250	-	-	0.02	0.02	0.02	0.00	0.00
Forested wetland	16,160	-	-	-	0.00	0.00	0.00	0.00
Agriculture	1,720	-	-	-	0.00	0.00	0.00	0.00
Developed	90	-	-	-	0.00	0.00	0.00	0.00
Total	**28,080**	**0.32**	**0.00**	**0.65**	**0.97**	**0.97**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.16-1 were adjusted to include an estimated 20 acres of Conservation Reserve Program (CRP) lands (Table 4.14.16-3) that were converted from cropland to wetland (1 percent, 0.2 acre) and grassland (99 percent, 19.8 acres) for the North Shore Highlands ECS subsection. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP land in Carlton County by the percentage of each county in the North Shore Highlands ECS subsection and the Kettle River Watershed. This reduced acreage then was multiplied by the 75 percent of the decimal fraction of wetland under pre-settlement conditions (see Table 4.14.16-1, see also Table 4.14.16-3), with the remainder placed in the prairie/grassland category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

Government Conservation Programs

As shown in Table 4.14.16-3, 20 acres in the Kettle River Watershed have been enrolled in the CRP, the CREP, or the RIM program.

TABLE 4.14.16-3
Land in Conservation Programs in the Kettle River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
North Shore Highlands						
Carlton	559,738	28,100	401	0	20	0
Total					**20**	**0**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the Kettle River Watershed and stated Ecological Classification System subsections were determined by GIS query. Aitkin County is not included because it is a minor percentage of the watershed (Table 4.14.4-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

According to the MBWSR state wetland reports for 1999 to 2003; Carlton County reported a total of 8.9 acres of impacts to wetlands from 1999 to 2000 and a total of 19.5 acres of impacts to wetlands from 2001 to 2003 under the WCA (MBWSR 2001, 2005).

Other Projects

Peat Mining

Peat mining is occurring on Fond du Lac State Forest land that is leased from the State of Minnesota. The peat mining is located approximately 6 miles from the proposed Project off the southwest corner of the FDL Reservation boundary. Peat is composed of the decayed remains of plants within wetlands. To harvest peat, the wetland is drained and the top layer of vegetation is removed. Only 1 to 2 inches of peat can be harvested per year from an area. However, the same plot can be mined over many years. Because wetlands are protected in Minnesota, peat mining requires permits from the COE and EPA (Robertson 2004). Therefore, cumulative wetland impacts would not be expected.

Based on the limited amount of peat that can be harvested each year, emissions would not be expected to be major at this facility. Therefore, cumulative impacts to air quality from this facility would be minor.

Timber Harvesting

Timber harvesting of an approximately 58-acre parcel occurs just west of the FDL Reservation boundary along the proposed Alberta Clipper route. This proposed Project route would intersect the south-eastern corner of this area and would result in a minor cumulative impact to forestlands.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern

Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Kettle River Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.16.3 Cumulative Impacts

Prior to settlement, the land use in the Kettle River Watershed within the North Shore Highlands ECS subsection was composed entirely of forest and wetlands. The baseline land use was 86 percent forest and wetlands. The process of settlement has been characterized by conversion of forest to prairie, wetlands, and agricultural lands. The proposed Alberta Clipper Project would impact substantially les than 0.01 percent of the total acreage of the Kettle River Watershed.

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Kettle River Watershed in Minnesota would be neutral relative to baseline conditions due to demographics and land use, the availability of conservation programs, and compensatory wetland mitigation.

4.14.16.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper route in the Kettle River Watershed would traverse prairie/grasslands (0.71 acre). The land uses that would be disturbed for the remainder of the route would include wetlands (0.02 acre) and forestlands (0.24 acre). Given the short crossing of the Kettle River Watershed (0.1 mile) sensitive resources would be limited. No waterbodies would be crossed within the Kettle River Watershed. However there are wetlands and other habitats that could contain tribal biological resources.

Wetlands

Wetlands compose 62 percent of the acreage in the watershed, virtually all of which is forested wetland habitat. Expansive wetlands, including forested wetland habitat, would be crossed by the proposed Project (Appendix P). Emergent wetland habitat would become reestablished following construction, but forested wetland habitat in the permanent right-of-way would not be allowed to become reestablished during operations. Compensatory mitigation may be required by the COE to ensure that no net loss of wetland habitat was associated with the proposed Project and other permitted projects in the watershed. In addition, as stated in Section 4.4.3, for the proposed Project, Enbridge would incorporate mitigation that is consistent with applicable policies, regulations, and rules governing compensatory wetland mitigation for purposes of Section 404 CWA. These include, but are not limited to, the draft St. Paul District, COE Compensatory Mitigation Policy for Minnesota, dated March 14, 2007; the Interagency Memorandum of Understanding regarding Wetland Mitigation Guidelines entered into by MBWSR and the St. Paul District, COE, on May 20, 2007; and the St. Paul District, COE mitigation guidelines for linear infrastructure projects. Enbridge would provide compensatory wetland mitigation for unavoidable

permanent and temporary impacts on forested wetland and scrub-shrub wetlands. Additionally, Enbridge has proposed to conduct post-construction monitoring in wetlands for a 5-year period to ensure that affected wetlands return to a pre-construction state. To further minimize impacts to the amount of available wetland habitat, we have included a recommendation that Enbridge mitigate impacts to wetlands with accepted restoration ratios and in consultation with the COE.

Tribal Biological Resources

Biological resources of concern identified by the FDL include wild rice, Northern white cedar, paper birch, sweetgrass, and blueberry. Surveys have been conducted to assess the potential occurrence of biological resources traditionally used by the FDL within the Project APE. Surveys for terrestrial plants found that Northern white cedar, paper birch, and blueberry were identified; but sweetgrass was not found. Wild rice surveys were also conducted. The currently proposed route across the FDL Reservation would not bisect any wild rice areas and would be located downstream from identified wild rice areas. Coordination with the FDL is being conducted in order to adequately protect and restore these species.

4.14.17 Beartrap-Nemadji River Watershed (Minnesota)

4.14.17.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Beartrap-Nemadji River Watershed encompasses 1,102 square miles in east-central Minnesota (approximately 258 square miles) and northwest Wisconsin (approximately 844 square miles). The watershed spans portions of Carlton County in Minnesota and Douglas County in Wisconsin (Figure 4.14.4-1). The proposed Alberta Clipper route crosses the Beartrap-Nemadji River Watershed in Minnesota for approximately 4.2 miles and crosses a portion of the Glacial Lake Superior Plain ECS subsection (Table 4.14.4-1, Figure 4.14.4-1).

The Glacial Lake Superior Plain ECS Subsection in Minnesota

Approximately 4.2 miles of the Alberta Clipper route through the Beartrap-Nemadji River Watershed in Minnesota is within the Glacial Lake Superior Plain ECS subsection. The proposed Alberta Clipper route through the Glacial Lake Superior Plain ECS subsection and the Beartrap-Nemadji River Watershed crosses only Carlton County in Minnesota.

Historically, the Beartrap-Nemadji River Watershed in the Glacial Lake Superior Plain ECS subsection was comprised of forestland (84 percent) and wetlands (16 percent) (Table 4.14.17-1).

TABLE 4.14.17-1 Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Beartrap-Nemadji River Watershed – Carlton County, Minnesota					
	Pre-Settlement Conditions		Baseline Conditions		
Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	GAP Land Use or NWI Acreage[c] (thousands)	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Glacial Lake Superior Plain					
Forest	75.04	84.31	53.14	59.70	-24.61
Shrubland	0.00	0.00	0.90	1.01	1.01
Prairie/grassland	0.00	0.00	10.56	11.86	11.86
Wetland	0.00	0.00	1.42 [d]	1.60	1.60
Forested/shrub wetland	13.96	15.69	12.32 [d]	13.84	-1.84
Agricultural	0.00	0.00	10.39	11.67	11.67
Developed	0.00	0.00	0.28	0.31	0.31
Subtotal	***89.00***	***100.00***	***89.01***	***100.00***	
GAP emergent wetland			*1.01* [d]		
GAP forested wetland			*11.46* [d]		

[a] Pre-settlement land cover distribution was determined using the Marschner Native Vegetation Map.

[b] Land use was determined using GAP (Gap Analysis Program, U.S. Department of the Interior, USGS).

[c] GAP acreage was modified to substitute National Wetlands Inventory (NWI) acreage for GAP forested and emergent wetland acreage estimates. NWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. GAP wetland data are provided in italics for comparison. NWI data indicate similar total wetland acreage; however, the acreages of emergent and forested wetlands are reversed when compared to GAP. The difference is likely due to the inclusion of wetlands with a palustrine scrub shrub component into the forested wetland category. The difference between GAP and NWI data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

[d] NWI forested wetland may be overestimated, as all scrub shrub wetlands were included as forested wetland in the analysis. Similarly, GAP may overestimate forested wetlands as all floodplain forests were placed in the forested wetland category.

Demographics

The population of Carlton County is approximately 33,900 people. The population increased by approximately 7.0 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Carlton County are Cloquet and Moose Lake (U.S. Census Bureau 2000).

4.14.17.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the Beartrap-Nemadji River Watershed in Minnesota from MP 1078.9 to MP 1083.2, for a total of 4.2 miles. Most of the proposed Alberta Clipper route within the Beartrap-Nemadji River Watershed in Minnesota crosses agricultural land. Table 4.14.17-2 compares the existing land use estimates for the Beartrap-Nemadji River Watershed in Minnesota and within the Glacial Lake Superior Plain ECS subsection with the effects of the proposed Alberta Clipper Project.

TABLE 4.14.17-2 Cumulative Effect of Combined Enbridge Projects in the Beartrap-Nemadji River Watershed – Carlton County, Minnesota								
Land Cover	**Current Land Use[a] (acres)**	**Baseline Land Use Existing Enbridge ROW[b]**	**Land Use in Added ROW[c] (acres)**	**Add'n. Alberta Clipper Perm. ROW[d] (acres)**	**Cum. Acres Perm. ROW[e] (acres)**	**Post-Restor.[f] (acres)**	**Change in Land Use[g] (acres)**	**Change in Existing Land Cover[h] (%)**
Glacial Lake Superior Plain								
Forest	53,140	7.08	1.72	2.91	11.71	0.00	-11.71	-0.02
Shrubland	900	0.01	0.11	0.00	0.12	5.98	5.86	0.65
Prairie/ grassland	10,624	5.25	0.89	3.02	9.16	15.02	5.86	0.06
Wetland	1,420	0.00	0.01	1.54	1.55	2.48	0.93	0.07
Forested wetland	12,320	0.20	0.00	0.74	0.93	0.00	-0.93	-0.01
Agriculture	10,326	25.62	7.24	18.66	51.52	51.52	0.00	0.00
Developed	280	0.19	0.00	0.00	0.19	0.19	0.00	0.00
Total	**88,010**	**38.35**	**9.97**	**26.86**	**75.18**	**75.18**	**0.00**	**NA**

[a] Ecological Classification System (ECS) data from Table 4.14.17-1 were adjusted to include an estimated 64 acres of Conservation Reserve Program (CRP) lands (Table 4.14.17-3) that were converted from cropland to grassland (64 acres) for the Beartrap-Nemadji River Watershed. CRP acres were removed from the agriculture category. Estimates were determined by multiplying the acreage of CRP lands in Carlton County by the percentage of each county in the Glacial Lake Superior Plain ECS subsection in the Beartrap-Nemadji River Watershed. All of the CRP acres allocated within the watershed were placed in the prairie/grassland category because no wetlands were present in the pre-settlement classification.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent of land cover when compared to county land cover acreages estimated under current conditions.

The baseline land use was 60 percent forestland**.** Of the lands crossed by the Alberta Clipper Project, 69 percent would be agricultural (52 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 12 acres would be forestland, 9 acres would be prairie, and 2 acres would be wetlands.

No substantial waterbody crossings are proposed for this portion of the proposed Project route.

State and County Highway Development

As stated in Section 4.14.14.2, MDOT identified two state projects that could impact wetlands in Carlton County (Forsland 2008). However, any negative impacts will be mitigated by wetland banking sites through the MBWSR.

Residential and Commercial Development Projects

There are no known residential or commercial projects planned for Carlton County.

Flood Control Projects

MDNR's Floodplain Management Program indicated that they are not aware of any flood control programs planned for the Beartrap-Nemadji River Watershed (Strauss 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

As shown in Table 4.14.17-3, a total of 64 acres in the Beartrap-Nemadji River Watershed have been enrolled in the CRP, the CREP, or the RIM program.

TABLE 4.14.17-3
Land in Conservation Programs in Beartrap-Nemadji River Watershed Counties in Minnesota Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Glacial Lake Superior Plain						
Carlton	559,738	89,000	401	0	64	0
Total					**64**	**0**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] A Conservation Lands Summary was prepared on February 20, 2009, by the Minnesota Board of Water and Soil Resources.

[b] County acres within the Beartrap-Nemadji River Watershed and stated Ecological Classification System subsections were determined by GIS query. Pine County is not included because it is a minor percentage of the watershed (Table 4.14.4-1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: MBWSR 2009.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: MBWSR 2009.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

According to the MBWSR state wetland reports for 1999 to 2003; Carlton County reported a total of 8.9 acres of impacts to wetlands from 1999 to 2000 and a total of 19.5 acres of impacts to wetlands from 2001 to 2003 under the WCA (MBWSR 2001, 2005).

Other Projects

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the 11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Beartrap-Nemadji Watershed. The Great Lakes Gas pipeline

route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.17.3 Cumulative Impacts

Prior to settlement, the Minnesota portion of the Beartrap-Nemadji River Watershed was 84 percent forestland. The baseline land use was 60 percent forestland and 14 percent forested/shrub wetlands. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the Beartrap-Nemadji River Watershed (including the portions in Minnesota and Wisconsin).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, commercial or residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable actions to natural resources within the Beartrap-Nemadji River Watershed in Minnesota would be neutral to positive relative to baseline conditions due to demographics and land use, the dominance of agricultural land types, and the availability of conservation programs.

4.14.17.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper Project within the Beartrap-Nemadji River Watershed in Minnesota would traverse agricultural land (52 acres). The remaining lands that would be disturbed by the Alberta Clipper Project include forestland (12 acres), prairie (9 acres), and wetlands (2 acres). No sensitive resources have been identified for the Beartrap-Nemadji River Watershed in Minnesota because the proposed Project crossing of the watershed would be relatively short (4.2 miles), the proposed crossing would be primarily in agricultural land, and no other projects have been identified in the watershed.

4.14.18 Beartrap-Nemadji River Watershed (Wisconsin)

4.14.18.1 Environmental Character, Pre-Settlement, and Baseline Conditions

Physiography

The Beartrap-Nemadji River Watershed encompasses 1,102 square miles in east-central Minnesota (approximately 258 square miles) and northwest Wisconsin (approximately 844 square miles). The watershed includes portions of Carlton County in Minnesota and Douglas County in Wisconsin (Figure 4.14.4-1). In Wisconsin, the proposed Alberta Clipper route crosses the Beartrap-Nemadji River Watershed in Douglas County for approximately 2.2 miles and crosses a portion of the Superior Coastal Plain ecological landscape (Table 4.14.4-1, Figure 4.14.4-1).

Superior Coastal Plain Ecological Landscape in Wisconsin

The proposed Alberta Clipper route through the Superior Coastal Plain ecological landscape within the Beartrap-Nemadji River Watershed in Wisconsin is entirely within Douglas County.

Historically, the Beartrap-Nemadji River Watershed in the Superior Coastal Plain ecological landscape was comprised of forestland (97 percent) and wetlands (2 percent) (Table 4.14.18-1).

TABLE 4.14.18-1
Comparison of Pre-Settlement[a] versus Baseline[b] Environmental Conditions in the Beartrap-Nemadji River Watershed – Douglas County, Wisconsin

Ecological Classification System (ECS) Subsection/ Land Use	Pre-Settlement Conditions		Baseline Conditions		
	Pre-Settlement Acreage (thousands)	Relative Percentage for ECS (%)	Wiscland Land Use Acreage (thousands)[c]	Relative Percentage for Watershed (%)	Percentage Change Pre-Settlement to Baseline (%)
Superior Coastal Plain					
Forest	536.56	97.42	329.64	60.03	-37.39
Shrubland	3.42	0.62	13.36	2.43	1.81
Prairie/grassland	0.00	0.00	121.42	22.11	22.11
Open water		0.00	11.55	2.10	2.10
Wetland	2.55	0.46	2.53	0.46	0.00
Forested/shrub wetland	8.19	1.49	53.48	9.74	8.25
Agricultural	0.00	0.00	6.43	1.17	1.17
Developed	0.00	0.00	5.74	1.05	1.05
Barren (unknown)	0.03	0.01	4.94	0.90	0.89
Subtotal	***550.75***	***100.00***	***549.09***	***100.00***	
Wiscland wetland			*3.76*		
Wiscland forested wetland			*48.59*		

[a] Pre-settlement land cover distribution was determined using the Wisconsin Native Vegetation Map (WDNR 1990).

[b] Land use was determined using Wiscland digital data set, WDNR 2002.

[c] Wiscland acreage was modified to substitute **Wisconsin Wetland Inventory (WWI)** acreage for Wiscland forested and emergent wetland acreage estimates. WWI forested wetlands include all wetlands indicated with shrub swamp and forested components as determined using GIS methods. Wiscland wetland data are provided in italics for comparison. WWI data indicate similar total wetland acreage; however, the acreage of emergent and forested wetlands is reversed when compared to Wiscland. The difference is likely due to the inclusion of wetlands with a palustrine scrub-shrub component in the forested wetland category. The difference between Wiscland and National Wetland Inventory data acreage was added or subtracted (as appropriate) from prairie and upland forest for emergent and forested wetlands, respectively.

Demographics

The population of Douglas County is approximately 43,700 people. The county population increased by approximately 1.0 percent from 2000 to 2007 (U.S. Census Bureau 2009). The largest towns in Douglas County are the City of Superior and the Town of Superior (U.S. Census Bureau 2000). The closest town to the Alberta Clipper Project is Superior.

4.14.18.2 Current and Reasonably Foreseeable Land Use

The proposed Alberta Clipper Project would cross the Beartrap-Nemadji River Watershed in Wisconsin from MP 1095.8 to MP 1097.8, for a total of 2.2 miles. Most of the proposed Alberta Clipper route in the Beartrap-Nemadji River Watershed would traverse prairie/grasslands. Table 4.14.18-2 compares the existing land use estimates for the Beartrap-Nemadji River Watershed in Wisconsin within the Superior Coastal Plain ecological landscape with the effects of the proposed Alberta Clipper Project.

TABLE 4.14.18-2 Cumulative Effect of Combined Enbridge Projects in the Beartrap-Nemadji River Watershed – Douglas County, Wisconsin								
Land Cover	Current Land Use[a] (acres)	Baseline Land Use Existing Enbridge ROW[b]	Land Use in Added ROW[c] (acres)	Add'n. Alberta Clipper Perm. ROW[d] (acres)	Cum. Acres Perm. ROW[e] (acres)	Post Restor.[f] (acres)	Change in Land Use[g] (acres)	Change in Existing Land Cover[h] (%)
Superior Coastal Plain								
Forest	329,640	0.54	0.12	0.00	0.66	0.00	-0.66	-0.0002
Shrubland	13,360	0.00	0.00	0.46	0.46	0.79	0,33	0.003
Prairie/grassland	121,420	7.72	3.23	5.79	16.74	17.07	0.33	0.0003
Wetland	2,559	0.29	0.22	5.23	5.74	16.95	11.21	0.44
Open water	11,550	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forested wetland	53,480	7.04	2.42	1.75	11.21	0.00	-11.21	-0.02
Agriculture	6,401	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barren	5,740	0.00	1.61	0.00	1.61	1.61	0.00	0.00
Developed	4,940	5.29	1.68	0.51	7.48	7.48	0.00	0.00
Total	**549,090**	**21**	**9**	**14**	**44**	**44**	**0.00**	**NA**

[a] Land cover data from Table 4.14.18-1 were adjusted to include an estimated 29 acres of Wetlands Reserve Program (WRP) land (see Table 4.14.18-3). WRP acres were removed from the agriculture category.

[b] The existing Enbridge right-of-way (ROW) carries three or four pipelines, three of which were constructed prior to 1980. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor as of 1980 baseline conditions.

[c] From 1980 to the date of this writing, Enbridge expanded the existing corridor to accommodate the Terrace 3 Pipeline Expansion. The acreages reported in this column represent estimated land use in the Enbridge right-of-way corridor added between 1980 and 2008.

[d] The Alberta Clipper Project would require an additional permanent easement (25 feet) for additional pipe within and adjacent to the existing easements.

[e] Total existing land use acreage in the total post-construction permanent easement.

[f] Estimated land uses in post-restoration acres. Agricultural land would revert to agricultural land. Prairie and shrubland acreage would increase where trees would be permanently removed to maintain the corridor. Emergent wetland would increase in areas where trees have been removed from forested wetland.

[g] Changes in acres of land in the existing right-of-way from pre-construction to post-restoration conditions.

[h] Overall change in percent land cover when compared to county land cover acreages estimated under current conditions.

The baseline land use was primarily forestland and prairie lands (approximately 82 percent). Of the lands crossed by the Alberta Clipper Project, 38 percent would be prairie/grasslands (17 acres). Of the remaining lands that would be disturbed by the Alberta Clipper Project, 17 acres would be wetlands, 1.6 acres would be barren, and 7.5 acres would be developed.

No substantial waterbody crossings are proposed for this portion of the Project.

State and County Highway Development

No highway improvement projects with known wetland or natural resource impacts were identified by WDOT in Douglas County (WDOT 2008).

Residential and Commercial Development Projects

Kimmes Construction has developed preliminary plans for a housing development near MP 1096.3. Kimmes Construction has not filed any details with the state or county regarding the project. Enbridge has secured an easement to an approximately 2.7-acre parcel of land on the eastern side of the planned

development. This easement states that Kimmes Construction would construct the proposed development around the proposed Alberta Clipper Project. However, this potential residential development would not be impacted by the proposed route, as Enbridge has agreed to construct through the adjacent Nemadji Golf Club based on consultations with the COE and WDNR.

Flood Control Projects

The WDNR Municipal Flood Control Grant Program indicated that they are not aware of any flood control programs planned for the St. Louis River Watershed in Wisconsin (WDNR 2008). Flood control activities are not expected to result in any unmitigated, adverse impacts to the watershed. Existing flood control programs likely would continue to result in the acquisition of conservation easements and to positively affect riparian zones and adjacent wetlands.

Government Conservation Programs

As shown in Table 4.14.18-3, no acreage in the Beartrap-Nemadji River Watershed in Wisconsin has been enrolled in the CRP, the CREP, or the RIM program. Approximately 29 acres were enrolled in the WRP.

TABLE 4.14.18-3
Land in Conservation Programs in Beartrap-Nemadji River Watershed Counties in Wisconsin Crossed by the Alberta Clipper Project (2009)[a]

County	Total County Acres	Watershed Acres in County[b]	CRP/CREP/RIM Acres in County[c]	WRP Acres in County[d]	CRP/CREP/RIM Acres in Watershed[e]	WRP Acres in Watershed[e]
Superior Coastal Plain						
Douglas	947,283	443,257	0	62	0	29
Total					**0**	**29**

CRP = Conservation Reserve Program.
CREP = Conservation Reserve Enhancement Program.
RIM = Reinvest in Minnesota.
WRP = Wetlands Reserve Program.

[a] Conservation lands data obtained from NRCS (2009b).

[b] County acres in the Beartrap-Nemadji River Watershed, Douglas County, and stated Ecological Classification System subsections were determined by GIS query (Table 4.14.4 1).

[c] Includes both federal and state conservation reserve programs. Lands are usually placed in native vegetation for 10 to 15 years. Source: NRCS 2009b.

[d] The Wetlands Reserve Program (WRP) restores historically farmed or drained wetlands. Source: NRCS 2009b.

[e] Watershed acres were estimated by dividing the acres in the watershed by the total county acres and then multiplying by the total county acres in conservation easements.

Other Projects

Superior Terminal Expansion

The existing Enbridge terminal at Superior, Wisconsin is a 167-acre site used to store and distribute crude oil to customers in the Midwest. Enbridge is proposing to expand the terminal to accommodate the crude oil that would be shipped there by the Alberta Clipper Pipeline.

The Superior Terminal Expansion Project would consist of five new storage tanks, five new distribution pipelines, five new pumps, electrical equipment, and other associated facilities; the total area of the site would be approximately 18.9 acres. In addition to the storage tanks, a 4,600-foot facility line is proposed for construction. This project is proposed to be constructed within the boundaries of the existing terminal. It is not part of the Presidential Permit Application submitted by Enbridge and DOS lacks permitting or regulatory authority over the expansion project, but it is considered a connected action to the Alberta Clipper Project and is discussed throughout Section 4.0 of this EIS. The project would be environmentally reviewed and permitted, if appropriate, by the COE and the State of Wisconsin.

Enbridge proposes to begin construction of the Superior Terminal Expansion Project in 2009, if approved, with completion planned for the end of 2010.

The Superior Terminal site is located almost entirely in wetlands; however, the area historically has been disturbed. The Superior Terminal Expansion Project would result in 11.9 acres of permanent fill of wetlands and an additional 3.2 acres of temporary impacts to wetlands. Impacts would be expected to be limited to minor loss of previously disturbed wetland habitat.

Superior Terminal Merchant Tanks

Enbridge previously expressed interest in constructing merchant tanks at the Superior Terminal to store petroleum products for use when supply is low and subsequent costs are elevated. Interest in these tanks is not related to the proposed Alberta Clipper Project; therefore, it is not a connected action. While there have never been formal proposals for this project, Enbridge indicated that it could consist of up to 17 tanks constructed on or adjacent to the Superior Terminal. The exact size, location, or potential impacts of this project were not quantified. However, at this time, previous potential customers are no longer interested in this project. Therefore, this project is no longer considered reasonably foreseeable. If pursued, the project would be environmentally reviewed by the COE and the State of Wisconsin.

Superior Terminal Tank Modifications

Enbridge is proposing several modifications to existing Superior Terminal tanks. On September 22, 2008, Enbridge received authorization from the WDNR under air permit number 08-DCF-102 to modify the existing external floating roofs for tanks 5 and 9 and to install a new diesel emergency generator. Additional planned modifications would include replacement of the tank floor; removal of 18 inches of existing tank wall at the bottom of the tank; routine maintenance and repair; and replacement and repair of the roof legs, deck fittings, existing tank foundation and ring wall, and piping (as required). Enbridge is also planning to increase the tank height from 48 to 54.5 feet. The combination of additional height and moving the sump to the tank floor will increase the capacity of each tank to 7,224,595 gallons (172,014 bbl). According to Enbridge, additional emission controls that will be installed on the tanks as a result of the modifications will decrease future potential-to-emit (PTE) emissions by 1.2 tpy compared to the existing tanks. Actual VOC emissions would increase by 0.006 tpy for piping components and 15 pounds per year for an emergency generator. WDNR approved Enbridge's PSD permit application and

BACT analysis. According to Enbridge, no wetlands or sensitive resources would be impacted as a result of the project (Enbridge 2009).

The second tank modification project currently planned by Enbridge would involve modifications to the existing internal floating roof for tank 3. Construction is expected to begin in 2009 upon receipt of a WDNR construction permit. Enbridge is planning to add 10 feet to the bottom of the tank in order to increase tank height from 48 to 58 feet, thereby increasing the capacity of the tank to 7,621,913 gallons (181,474 bbl). Additional improvements may include the addition of a rim-vent and slotted guide pole, possible removal of the ladder wall, replacement of the existing tank foundation and ring wall (if necessary), and piping modifications. Enbridge is also planning various maintenance activities for the existing pipes, valves, and flanges within the terminal. According to Enbridge, additional emission controls that will be installed on the tank as a result of the modifications will decrease future PTE emissions by 0.15 tpy compared to the existing tanks. Actual VOC emissions would increase by 0.01 tpy for piping components and 0.18 tpy for miscellaneous piping projects. Enbridge has submitted a PSD permit application and BACT analysis to WDNR for approval. According to Enbridge, no wetlands or sensitive resources would be impacted as a result of the project (Enbridge 2009).

Husky Energy Tank Modifications

Husky Energy (Husky) owns existing tanks 28 and 29 at the Superior Terminal, which are currently operated by Enbridge. Husky submitted an application to WDNR to modify these tanks in order to accommodate increased pipeline fill rates on an existing inbound pipeline. The modifications would include changes to the nozzle configuration and sizing, increased tank venting capacity, and the addition of vacuum breaker vents. According to Husky, construction is expected to begin in 2009, upon issuance of a WDNR permit. Husky also plans to construct an additional external floating roof storage tank (tank 41) at the Superior Terminal adjacent to existing tanks. Construction is expected to take place in 2010. According to Enbridge, impacts to wetlands and sensitive resources are not expected. According to Husky, the project is expected to increase VOC emissions by 24.2 tpy. Husky has submitted a PSD permit application and BACT analysis to WDNR for approval. According to Enbridge, the Husky projects would be constructed regardless of the Alberta Clipper Project; therefore, it is not a connected action.

Murphy Oil Refinery Expansion

Murphy Oil has indicated an interest in expanding its refinery in Superior, Wisconsin. The expansion would include upgrading its facilities to refine heavy crude oil. Although the upgrade would allow Murphy Oil to refine the oil transported by the Alberta Clipper Project, there is no commercial arrangement to provide additional heavy crude oil to Murphy Oil. The potential expansion apparently would increase the area of the refinery from 200 to over 600 acres, including 200 to 350 additional acres of wetland habitat (Passi 2008). The capacity of the refinery would reportedly increase from 35,000 to 235,000 bpd. No formal application has been submitted to federal or state regulatory agencies, and DOS does not have any regulatory or permit authority over refinery expansion or operations.

Although there is no indication that this expansion project is reasonably foreseeable, additional information on potential cumulative impacts to regional air quality associated with this potential refinery expansion and potential refining of oil transported by the Alberta Clipper Project is provided in Section 4.14.3.12.

Lake Superior and the St. Louis River Estuary

The St. Louis River is the major U.S. tributary to Lake Superior, the largest and deepest of the Great Lakes. In addition, the lower 21 river miles of the St. Louis River include a 12,000-acre freshwater estuary (Figure 4.14.2-1) (St. Louis River Citizens Action Committee 2002).

Within the St. Louis River Estuary, the proposed Alberta Clipper Project would cross approximately, 17 waterbodies. These crossings would be conducted in accordance with COE-approved LEPDA methods and the mitigation measures discussed in Sections 4.3.2.2 and 4.7.4. As a result, the impacts to these waterbodies associated with construction of the Alberta Clipper Project would be minor and generally temporary or short term, due to the limited nature and duration of the impacts at waterbody crossings. Additionally, any impacts that occurred downstream of these waterbodies would be further minimized because turbidity and sedimentation levels would decrease based on the distance from the crossing locations. The St. Louis River is located over 5 miles downstream from the Superior Terminal. The Nemadji River is located approximately 0.5 mile from the proposed Project at the Superior Terminal. As discussed in Section 4.3.2.2, construction methods for the Alberta Clipper Project would include BMPs to minimize erosion into waterbodies. BMPs would also be implemented for other construction activities at the Superior Terminal to minimize erosion, turbidity, and sedimentation in accordance with required permits from the COE and WDNR.

There is the potential for an accidental leak or spill within the Superior Terminal, although the Superior Terminal Expansion Project would have an SPCC Plan and an ERP to minimize the likelihood of a spill, limit the extent and duration of a spill if it were to occur, and remediate any soil impacts. The SPCC Plan highlights procedures for the proper storage and handling of fuels and hazardous liquids, spill management, and spill containment and cleanup. Implementation of procedures outlined in the SPCC Plan would ensure that contractors would be prepared to respond to any spill incident. These measures are designed to contain all contaminants and prevent them from migrating offsite. These measures have been developed in accordance with DOT requirements and are intended to minimize the likelihood of a spill and the impacts of a spill if one were to occur. Therefore, impacts to the St. Louis River and Lake Superior are not expected, and would be minor and short term if they did occur.

Air quality permitting would be required for the Superior Terminal Expansion Project, other modifications at the Superior Terminal that could potentially cause substantial emissions, and the Murphy Oil Refinery Expansion. If it is determined that emissions are predicted to exceed required thresholds during the permitting process, the applicants may have the opportunity to purchase emission reduction credits (ERCs) to offset the difference. While ERC programs vary by jurisdiction, all ERCs must be real, permanent, quantifiable, enforceable, and in surplus of regulatory requirements. Offsets are designed to reduce emissions while allowing for growth by either reducing emissions at another facility or by creating emission reduction programs in the area where offsets are being purchased. In addition, offsets must be made in excess of the amount required, and most agencies "retire" a percent of the offsets to further benefit air quality. While there are restrictions on the distance where offsets can be purchased, the offset ratio, or amount of additional offsets beyond what is required, also increases with distance, along with the air quality benefit. It is expected that offsets for the Superior Terminal would benefit air quality in the vicinity of the City of Superior.

Great Lakes Gas Pipeline Project

The Great Lakes Gas Pipeline Project is a dual natural gas pipeline that crosses into Minnesota from Canada near the North Dakota state line and continues east across Minnesota, northern Wisconsin, and Michigan—where it crosses back into Canada outside Detroit. The Great Lakes Gas corridor in northern Minnesota is approximately 300 miles long. The Great Lakes Gas pipeline crosses nine watersheds of the

11 watersheds that would be crossed by the Alberta Clipper Project and included in this assessment. The Great Lakes Gas pipeline route crosses the Beartrap-Nemadji Watershed. The Great Lakes Gas pipeline route was installed between 1967 and 1968 and later looped in the late 1990s. Due to the separation of the two projects in distance and time, minor cumulative impacts are expected.

4.14.18.3 Cumulative Impacts

Prior to settlement, the land use in the Beartrap-Nemadji River Watershed in Wisconsin was composed almost entirely of forest and wetlands. The baseline land use was 70 percent forest and wetlands. The proposed Alberta Clipper Project would impact less than 0.1 percent of the total acreage of the Beartrap-Nemadji River Watershed (including the portions in Minnesota and Wisconsin).

The cumulative impacts from the current and reasonably foreseeable actions discussed above would be relatively minor as they would be subject to current environmental regulations that require a detailed inventory of sensitive resources, alternatives to avoid sensitive resources, minimization of impacts, and mitigation for unavoidable impacts.

- No adverse impacts from potential or planned highway projects, residential developments, or flood control projects are currently or reasonably foreseeable within the watershed.
- The majority of cumulative impacts from current and reasonably foreseeable proposed actions to natural resources within the Beartrap-Nemadji River Watershed in Wisconsin would be neutral relative to baseline conditions due to demographics and land use, and the availability of conservation programs.
- Identified current and reasonably foreseeable projects in the vicinity of the Superior Terminal and the Murphy Oil Refinery would require environmental review and regulatory permits, which would include mitigation measures during construction and operation, compensatory mitigation to offset any permanent wetland losses, and air emission offsets if the potential existed for significant cumulative impacts from air emissions.

4.14.18.4 Cumulative Impacts on Identified Sensitive Resources

Most of the proposed Alberta Clipper Project within the Beartrap-Nemadji River Watershed in Wisconsin would traverse prairie/grasslands (17 acres). The land uses that would be disturbed for the remainder of the route in the watershed include forested wetlands (11 acres), wetlands (6 acres), and developed (7.5 acres). The length of the proposed Project route is only 2.2 miles long in this watershed, and no named waterbodies would be crossed by the proposed Project in the watershed.

While the proposed Project would not substantially contribute to wetland loss in the watershed, the other projects in the vicinity of the Superior Terminal and the Murphy Oil Refinery could result in substantial wetland loss, especially if the Murphy Oil Refinery expansion moves forward and is approved and implemented. The proposed expansion of the Superior Terminal and the expansion of the Murphy Oil Refinery would require mitigation measures to avoid and minimize impacts to wetlands, including compensatory mitigation, or the projects would not receive necessary approvals from the federal or state regulatory agencies.

4.14.19 Conclusions

This cumulative impacts analysis included a Project-wide assessment and a watershed-by-watershed assessment of cumulative impacts. The Project-wide assessment focused on impacts of the proposed Alberta Clipper Project in conjunction with other large-scale past, present, and reasonably foreseeable

projects in the general Project area (or ROI). The other large-scale projects included the existing Enbridge pipelines, the Keystone pipeline, the MinnCan pipeline, the CapX2020 transmission line, the Great Lakes Gas pipeline, and potential expansion of the Murphy Oil Refinery. The watershed-by-watershed assessment focused on potential impacts within individual watersheds along the proposed Project route associated with the proposed Alberta Clipper Project, other large-scale projects, and small-scale projects within individual watersheds. Smaller-scale projects included state and county highway development; residential and commercial development; flood control; government conservation programs; and other projects specific to individual watersheds, such as specific mining or timber harvesting activities.

The primary impacts of the Alberta Clipper Project would be short-term construction impacts to land use, habitats, and water quality, and long-term impacts associated with conversion of land cover primarily within the permanent right-of-way. The proposed Alberta Clipper Project would impact approximately 0.07 percent of the total acreage of all 11 watersheds reviewed in this assessment (the ROI). The Project-wide assessment also considered potential impacts associated with refining the heavy crude oil that would be transported via the proposed Alberta Clipper Project. The Project-wide assessment concluded that the cumulative impacts to these resources would be minor associated with the Alberta Clipper Project in conjunction with other large-scale projects because of the required mitigation measures that have been or would be implemented by these projects and the separation in time and space of the project impacts.

The watershed-by-watershed assessment concluded that a variety of small-scale projects would both adversely and beneficially impact land use in these watersheds. Along the northern portion of the proposed Project route, ongoing government conservation projects largely have resulted in increases in overall wetland habitat in the watersheds north of the Clearwater Watershed (with a corresponding decrease in agricultural acreage). Thus, the various projects in these watersheds have resulted in an overall neutral-to-positive impact on the environment. In the watersheds south of the Clearwater Watershed, agriculture and subsequently government conservation programs to convert agricultural lands are much less prevalent. Wetland habitat is much more prevalent in most of the watersheds along the proposed Alberta Clipper route south of the Clearwater Watershed. Potential impacts from the Alberta Clipper Project and other projects would affect a small proportion of these wetlands. Non-forested wetlands that would be affected would revert to pre-construction conditions following construction, and forested wetlands would be allowed to reestablish in construction workspaces. However, forested wetlands in the permanent footprint of the Alberta Clipper and other projects (such as the CapX2020 transmission line, Superior Terminal Expansion Project, and the potential Murphy Oil Refinery expansion) could not be restored to pre-construction conditions. If all of these projects were implemented, the total impact would be less than 1 percent of the wetland habitat in these watersheds. In addition, no net loss of wetland habitat would occur because approval for these projects would require compensatory wetland mitigation. Therefore, no significant cumulative impacts are associated with the Alberta Clipper Project in conjunction with other large-scale and small-scale projects in watersheds along the Alberta Clipper route.

4.14.20 References

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